The Metals REVIEW

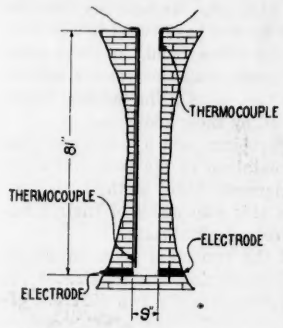
OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVIII APRIL 1945 Number 4

Salt Bath Furnace For Long Parts Cuts Distortion

A new internally heated electric salt bath furnace has been especially designed and built for heat treating, in vertical position, long broaches and similar work likely to distort when heat treated horizontally. Noteworthy feature of the furnace is its extreme depth in comparison with its surface area. It is a product of Upton Electric Furnace Division, 7450 Melville, Detroit 17, Mich.



The depth of the furnace is 81 in., while the surface is only 9 in. square. Such proportions have heretofore never been successfully combined in an internally heated electric salt bath furnace largely because of the limitations of the conventional type of electrodes. Upton electrodes enter through the sides of the furnace and at the bottom of the pot. Thus, with no space required for electrodes in the working area of the pot itself, the pot need be only of sufficiently large surface area to admit the work.

Proof of the efficiency of the new design is furnished in actual operation where, while a temperature drop of 4° F. (just enough to actuate the "on" and "off" controller) can take place at the bottom of the pot, the molten salt at the top of the pot remains at practically constant temperature. Moreover, when long pieces of cold work are introduced into the bath, there is a uniform drop in temperature through the entire bath.

The sketch shows position of the electrodes, shape of the pot, and the two thermocouples, one at the top and the other at the bottom of the pot, which record the temperature and actuate the "on" and "off" controller.

Mention R855 When Writing or Using Reader Service

More New Products on pages 17 *and* 19.

Mahin Suggests Remedies for Common Errors in Testing

Reported by Samuel N. Hunter
Metallurgist, Standard Steel Spring Co.

The presence of E. G. Mahin, head of the Department of Metallurgy, University of Notre Dame at the Feb. 16th meeting of the St. Louis Chapter A.S.M. accounted for the sizable attendance to hear his forceful discussion on "Physical Testing."

Dr. Mahin throughout his address pointed out the importance of his adopted slogan "know why" in the working and testing of metals. Professor Mahin's address was illustrated with slides depicting modern methods of physical testing.

The speaker pointed out many common errors committed in testing various materials and suggested remedial procedures to be followed. In the closing remarks of his address he declared, "Materials do not uniformly follow the same yield curve, or a common law of generalization."

Four Types of Welding Used for Aluminum

Reported by T. E. Hamilton
Metallurgist, Delco Products Division, General Motors Corp.

Four types of welding applicable to aluminum alloys were discussed by G. O. Hoglund of the Aluminum Co. of America before the Dayton Chapter A.S.M. on Feb. 14. These are gas, arc, and resistance welding, and brazing.

Mr. Hoglund also talked about the weldability of the different aluminum alloys and concluded his talk with a film depicting actual welding operations.

Compliments

To ZAY JEFFRIES, vice-president, General Electric Co., Pittsfield, Mass., on the award of the Clamer Medal of the Franklin Institute "for meritorious contributions to the science of metals, which he has placed on a new and more intelligible basis"; also on the first award of the newly established annual Powder Metallurgy Medal of the Stevens Institute of Technology and the presentation of the first annual Medal Lecture.

-*-

To CLARENCE E. SIMMS, supervising metallurgist, Battelle Memorial Institute, Columbus, Ohio, on the award of the Penton Medal of the American Foundrymen's Association "for outstanding work in behalf of the steel foundry industry."

-*-

To ROBERT E. KENNEDY, secretary, American Foundrymen's Association, on the award of the Joseph F. Seaman Medal of the A.F.A. "for his outstanding and long continuous work on behalf of the foundry industry in general."

-*-

To the NEW HAVEN CHAPTER A.S.M. on its innovation of including printed abstracts of previous meetings along with the advance notices of chapter meetings mailed to the members each month.

What's NEW . . . . . in THE METALS REVIEW

Review of Current Metal Literature

Other Departments

PASS-A-ROUND

	Name	Item No.
Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.		

Hardenability Testing Speeded Conversion to NE Steel, Rowland Says

Reported by G. G. Luther
Metallurgist, Naval Research Laboratory

When the shortages brought about by the emergency limited the use of some alloying metals, the system of composite NE steels was ordained in preference to the standardized and higher alloyed SAE steels. The production requirements of the steel industry naturally limited the experimental testing of the "ersatz" material, and the existing knowledge of hardenability did much to speed the transition to the newer steel specifications.

This situation was explained by E. S. Rowland, research metallurgist, Timken Roller Bearing Co., before the Washington Chapter A.S.M. on Feb. 12. Dr. Rowland spoke on "Factors Affecting Hardenability" and exhibited an extensive personal knowledge of the fundamental aspects as well as practical applications of this rather recent addition to metallurgical research and production control.

Early in the study of hardenability, the speaker continued, many discrepancies in data retarded the direct application to industrial practices. By means of data collected on several steels including SAE 4130, 4340, 50100 and others covering the complete carbon range, Dr. Rowland discussed the effect of prior structure (which is in turn the result of prior heat treatment) on the hardenability of steels.

The time that a steel is held at the quenching temperature is dependent on both an inherent property and the prior treatment of the steel. Quenching temperature likewise has a definite effect on the hardenability. It is interesting to note that all these variables may not be treated universally for all steels alike, but each class of steel has its own individual trends under each of these conditions.

In concluding, Dr. Rowland stated that the results of testing for hardenability may also show variations because of the solution rate of carbon on heating into the austenitic range, the carbon concentration gradient in austenite, the grain size at the time of quenching and the exact condition of carbide nuclei formed at the quench.

Resistance Welding Course Offered, Slide Films and Lesson Books Included

A new seven-part training course on "Resistance Welding Control," using slide sound films, lesson books, quiz book, and an instructor's manual has been prepared by Westinghouse Electric & Mfg. Co. Slide films for use with 35-mm. sound equipment give clear, visual explanations of the basic theory and applications. Seven lesson books in handy pocket size and one quiz book are provided each member of the class. An instructor's manual and informative booklets on resistance welding in industry are included.

For a class of 20 a complete set of material costs $50.00. Orders for the resistance welding control training course should be sent to C. R. Riker, supervisor, Extension Training, Westinghouse Electric & Mfg. Co., 306 Fourth Ave., Pittsburgh 30, Pa.

New Sound Film Tells Story of Carbon

"Carbon—Black Treasure" is the title of a 16-mm. Kodachrome sound film prepared by the National Carbon Co., Inc. The story treats of carbon, the element, the characteristics and development of fabricated carbon, its application to the electric arc, the manufacture of electrodes and anodes and their use. The final sequence is a dramatic exposition of electric steel manufacture. Showing time is 37½ min.

The film is available to regional and local meetings of A.S.M. chapters and other educational groups. Inquiries should be addressed to Mr. R. L. Baldwin, Advertising and Sales Promotion Department, National Carbon Co., Inc., 30 East 42nd St., New York 17, N. Y.

Boston Chapter Toasted on Silver Anniversary

A toast to the Boston Chapter on the occasion of its 25th birthday. Left to right—Past Chairmen E. N. Downing, A. J. McDuff, I. H. Cowdrey, National President K. R. Van Horn, Chairman John Norton, National Secretary W. H. Eisenman, Vice-Chairman R. G. Sault, and Past Chapter Chairman, Past National Trustee E. L. Bartholomew.

Cowdrey Tells Early History; Handy Secretary for 20 Years

Reported by Horace Ross
Henry Disston & Sons, Inc.

Twenty-five years of growth was celebrated by the Boston Chapter on Feb. 2 with a gala Silver Anniversary program. About 20 past chairmen and charter members were guests of the chapter at the head table. At the close of dinner, which included candle-lighted birthday cakes, Chairman John T. Norton proposed a toast to the Boston Chapter which was drunk in champagne.

Also honored on this occasion was Howard E. Handy, upon completion of 20 years as secretary of the Boston Chapter. He was presented with a suitably engraved silver bowl in appreciation of his service.

Prof. I. H. Cowdrey, Massachusetts Institute of Technology, Boston's first secretary and second chairman, gave a brief talk on the experiences and personalities of the early years of the chapter.

National Secretary Bill Eisenman described the founding of the chapter as detailed in one of the Society's early journals. Of historic interest was the account of the first eduational course in "Metallography" conducted within a year of the organization by V. O. Homerberg, Massachusetts Institute of Technology.

Dr. Van Horn presented an able and well-illustrated technical lecture on the "Application of Aluminum Alloys."

Properties of End Product Decide Metal-Plastics Choice

Reported by Don Sener
Assistant to Special Representative, Harrisburg Steel Corp.

The York Chapter of the American Society for Metals, with four other engineering and technical organizations as its guests, had as speaker for the February meeting, Wesley S. Larson of the Plastics Division of General Electric Co. The speaker presented his views on the controversial topic of "Plastics Versus Metals."

Mr. Larson steered away from the use of plastics in war materials as a basis of his talk; because of the urgency of war needs, the design of many plastic articles is not the best, and the costs are out of line.

His remarks fell under six headings, in the following order: Families of plastics, unique governing properties of final product, methods of manufacture, strength and its function, relative costs, and final appearance. The families of plastics include hot molded resins, laminates, cold molding materials, contact laminates, and casting resins.

The final choice between plastic and metal may depend upon the unique properties of the end product. These governing properties are electrical conductivity or insulation, optical properties, rigidity, thermal conductivity or insulation, hardness, fire and chemical resistance, weight and dimensional accuracy.

If the final choice is not dictated by a unique property, it will then usually depend on formability, strength, cost and appearance. The methods by which plastics can be formed compare favorably with the methods of forming metals.

Compared as to strength, metals greatly out-rank plastics on a per-sq. in. basis, but are inferior to the plastics on a per-lb. basis. Cost of plastics will eventually be reduced and the choice of a metal or plastic finish will depend upon the consumer, Mr. Larson concluded.

Metallography in Shop Relates Chemistry and Engineering

Reported by G. F. Kappelt
Assistant Metallurgist, Bell Aircraft Corp.

Metallography must be considered the vital link between pure chemistry and engineering for it correlates the facts of chemistry with the desired properties specified by the engineer. In this manner it is responsible for the service life of present-day products, according to O. W. McMullan, chief metallurgist of Bower Roller Bearing Co., Detroit, addressing the Buffalo Chapter on Feb. 8 on "Fundamentals of Metallography in Shop Practice."

In order to develop clearly the condition of the product being examined, the utmost care must be exercised in the selection and preparation of the specimens. Mr. McMullan explained further how the distribution of constituents affects the manufacturing process. Although there is a good deal of discussion as to the most suitable structure for machining, Mr. McMullan believes that, in general, the acicular type or Widmanstätten structures are not good for machining.

The so-called abnormality of carburizing grades is more probably due to dissolved iron oxide than other causes sometimes mentioned—for example, phosphorus in screw stock or segregation of phosphorus in ghost lines.

Certain types of steel, such as the 4100 series, are not ideal for carburizing. In these steels it is usually found that the case-hardened zones will possess a soft skin. The skin is shallow and therefore of no damage to parts ground after being hardened.

Mr. McMullan showed slides illustrating various types of structure, including a spectacular micro of the cross-section of a 2⅛-in. diameter tierod. In service it had constantly undergone working followed by recrystallization, the results of which produced a columnar zone ¾ in. wide around the complete circumference of the rod.

Gray Iron Founders' Society Announces Awards for Original Research Reports

To stimulate further investigation and study of the properties of gray irons and to encourage continued research in gray iron metallurgy, the Technical Committee of the Gray Iron Founders' Society, Inc., has established two annual awards for original research reports of outstanding merit on subjects designated by the Committee. The first award consists of $500 in cash, and the second award $200.

To be considered for the 1945 awards papers shall deal with investigations, studies or determinations within the scope of the following subjects: Creep Values of Gray Irons at 600-800° F.; Elongation of Gray Irons; Impact Values of Gray Irons; Machinability of Gray Irons; and Modulus of Elasticity of Gray Iron.

All papers for entry in the 1945 competition should be addressed to the Technical Committee, Gray Iron Founders' Society, Inc., 1201 Nineteenth St., N. W., Washington, D. C., for receipt not later than August 5, 1945.

Inoculation Methods For High Strength in Cast Iron Outlined

Reported by Don Sener
Assistant to Special Representative, Harrisburg Steel Corp.

New requirements in recent years have placed new demands on cast iron and necessitated much of the research work that has developed the methods of inoculation of base irons with alloys. The subject of inoculation was the principal concern of a talk on "High Strength Irons and Alloys in Cast Iron" before the January meeting of the York Chapter presented by Fred W. Hanson, a former chairman of the Birmingham District Chapter and now of the Electro Metallurgical Co. of New York.

The specific job of the inoculant is to reduce the tendency to chill, thereby producing optimum tensile strength, transverse strength, higher abrasive value, higher heat resistance, less linear change, and less deflection under load.

In order to secure maximum strength by inoculation, it is necessary to have a base metal low in carbon and silicon. On the other hand, to serve as a good inoculant, the material must be readily soluble and not change the melting point. The fluidity of the mass is greatly improved by their addition.

The most difficult problem which confronts the user of inoculants is contained in the fact that after addition, the various elements added to the bath have a tendency to fade. In this way many of their beneficial characteristics are not obtainable.

The speaker defined the two main types of inoculants, graphitizing and stabilizing, and illustrated the use of various alloys to produce the two different effects.

Because many of the men in the group were steel men, he included in his talk a short and concise description of the methods of ascertaining the physical properties of cast iron. These tests are in part similar to those performed on steel but in their essentials are different.

Steels for Cold Treating Listed As 2512, 2315, 3312, 4615, 4815

Reported by W. T. Rubin
Metallurgist, Copperweld Steel Co.

A few of the many and varied applications of cold treatment and the results obtained therefrom were described by Fred Whitcomb, field service engineer and sales promotion manager, Deepfreeze Industrial Division, Motor Products Corp., before the Warren Chapter on Feb. 8.

One of the most important applications of cold treatment is stabilizing, wherein the transformation of retained austenite to martensite takes place. The speaker listed 2512, 2315, 3312, 4615 and 4815 as some of the steels which are unusually responsive to sub-zero treatments, and pointed out that parts which had been heat treated and had lain around for as long as a month could be given sub-zero treatments for improved performance.

It was pointed out, however, that the longer the parts had been lying around, the lower the sub-zero temperature necessary. The speaker also cautioned that parts which had been cold treated must be heated to 250 or 300°F. before hardness checks could be taken.

There are advocated at the present time five distinct points at which the cold treatment should be included for high speed steels. These, according to the speaker, are:

1. Immediately after the quench. This cold treatment is followed by the conventional tempering procedure.
2. Quench, first temper, cold treatment at —120°F. followed by the second temper.
3. Quench, temper at 300°F. and then cold treat at —120°.
4. Simply cold treat at —120°F.
5. Alternate hot and cold treatments.

The speaker adjudged the second recommendation to give the best results from a practical standpoint.

MacDermid Appoints McNeil Sales Engineer

MacDermid, Inc. of Waterbury, Conn., recently announced the appointment of Arthur R. McNeil as technical sales engineer for Southern Connecticut. Mr. McNeil is president of the Bridgeport Branch of the American Electroplaters Society and is a member of the Electro Chemical Society. He was formerly finishing supervisor at Bridgeport Thermostat Co.

Krivobok Discusses Problem of Rigidity In Aircraft Structures

Reported by F. P. Kristufek
Research Laboratory, U. S. Steel Corp.

Although a discussion of the metallurgical aspects of the aircraft industry must necessarily be somewhat restricted at present, V. N. Krivobok's talk on "Metallurgy in Aircraft" at the Feb. 19th meeting of the New Jersey Chapter A.S.M. was both thorough and interesting.

Four significant trends in modern aircraft design, as enumerated with the aid of slides by Dr. Krivobok in his usual entertaining manner, have been the increase in gross weight, wing loading, and cruising speed with the useful load ratio remaining constant.

Production demands have necessitated the extensive utilization of spot welding resulting in a great reduction in the number of rivets formerly used although numerous "stop" rivets are still employed in conjunction with spot welds to prevent fatigue failure. The speaker stressed that good results in production spot welding are obtained by maintaining very close control of surface preparation, spot welding equipment and procedures.

Aluminum Will Predominate for Structure

Regarding the use of aluminum, Dr. Krivobok stated that approximately 50 to 60% of all aluminum parts have been formed in the soft condition. With high production demands, forming at elevated temperatures permits the use of aluminum alloys in "hard" condition. It has been learned that fatigue failures in aluminum alloy sand castings are considerably reduced by peening. Dr. Krivobok expressed the belief that aluminum alloys will remain the top ranking aircraft structural material in aircraft for the duration.

However, he emphasized that comparison of alloys for aircraft will be made not only on the weight-strength ratio of each but also on the "buckling" strength that can be developed in fabricated structures. The problem of rigidity is an important one in aircraft structures and stainless steel sheet is at a disadvantage as compared with aluminum alloy sheet.

However, this can be overcome by proper design and the advantages of stainless (spot welding) can be utilized. The corrugation principle is used extensively to secure rigidity in stainless sheet although this procedure creates the desired strength in only one direction. New methods of fabrication of corrugated sheets may overcome this difficulty.

Magnesium Peening With Glass Shot

Production of magnesium has increased from 12½ million lbs. in 1940 to 600 million lbs. in 1943, according to Dr. Krivobok, with magnesium castings and possibly forgings being the forms used most extensively at present. Magnesium sheet is not generally used in aircraft for structural parts because of pronounced variations in the physical properties of one sheet from another, susceptibility to stress corrosion and other technical reasons. Recent developments show that artificial aging of magnesium sheets results in improvement of their physical properties.

An interesting point mentioned by Dr. Krivobok is that peening of magnesium parts with glass shot indicates possible solution of the problem of stress corrosion in such parts, glass shot being employed to prevent surface contamination that would usually result from the use of shot such as cast iron.

Another important war contribution has been the great progress made in refinement of the grain size of magnesium castings, resulting in increases of the more desirable physical properties of these castings.

Resistance Strain Gage Represents Important Advance in Physical Testing

Reported by Taylor Lyman
University of Notre Dame

One of the largest factors in recent advances in physical testing has been the use of the electrical resistance strain gage, Francis G. Tatnall of the Southwark Division, Baldwin Locomotive Works, told the Notre Dame Chapter at the December meeting.

The speaker described the instrument and also discussed methods of temperature compensation, cancellation of unwanted bending strains, measurement of torsional strains, and the use of rosettes (multiple gage arrangements) for determining the magnitude and direction of principal strains where the state of stress is unknown. His talk has been reported when presented before other meetings.

Airplane Cannot Supplant Land and Sea Forces In Transportation or War, Editor Believes

Reported by J. C. Harvey
Tennessee Coal, Iron & R. R. Co.

Regardless of the views of such air enthusiasts as Major Seversky and Air Marshal Bishop the airplane will not take over all our transportation nor will it become our only or even prime weapon in time of war. This was the opinion expressed by E. E. Thum, editor of METAL PROGRESS, when he addressed the Birmingham District Chapter A.S.M. on March 13.

The main reasons for this are the reasonable limitations of the machine itself. While considerable improvements in design are to be expected, no revolutionary improvement in the strength of metals can be expected; the weight of an airplane engine is now about 1 lb. per hp. and possibly might be reduced to about 0.8 lb.

The speaker cited an example in the use of aluminum alloys. The Germans developed the use of duralumin in the last war. It has a yield strength of about 30,000 psi.; the standard aluminum alloy used in planes today has about 46,000 psi. yield strength and the Aluminum Co. of America has developed one with a yield strength of about 66,000 psi. However, the ductility falls off correspondingly and any usable strength much higher than this is not expected.

Proponents of aircraft as an all-powerful weapon point out that the Germans were able to invade Norway because of air superiority, the Japs attacked Pearl Harbor because we were unprepared, Crete was invaded by air and the Repulse and the Prince of Wales were sunk by a fleet of Japanese planes. However, the ascendancy of aircraft did not persist; the story was quite different two years later when an American task force was attacked by a force of 75 Jap planes. Twenty were shot down and the rest forced to retire and all they scored was one near miss, proving that the modern battleship can take care of itself against air attacks. Again, despite terrific pounding from the air for two years the German civilian population still functioned as a nation.

Cost Ratio Is 35 to 1

To supplant the battleship, the aircraft would have to deliver soldiers and equipment. Assuming an invasion of Japan from a Philippine base, the latter in turn supplied by air (exclusively) from our West Coast, each freighter reaching Japan would require 15 similar planes to keep it supplied. The cost of transporting fuel by air as compared to by ship is in the ratio of 35 to 1, and is not likely to be reduced to near parity.

The experiments with the giant amphibious plane, the Mars, were very successful indeed. The plane has a range of 3500 miles and the engineers expect to increase the range to 4000 miles with an increase of 25% in speed and the same carrying capacity. However, it is still impossible to transport a 60-ton tank by air.

We, in this country, are air-minded and the speaker thinks we should be sea-minded also in terms of defense for the future. While admitting that the airplane is a marvelous weapon in warfare, in the final battle the marines have to land and the infantry has to occupy the territory before the battle is won.

Therefore the airplane should be regarded as a valuable means of emergency transportation or as a weapon, but cannot completely supplant the older methods. Even Air Marshal Bishop finally admits that it takes a coordination of land, sea and air forces to win. This could be said for peacetime operations as well as for war.

Hardenability Studies Applied To Plant and Laboratory Work

Reported by Henry Hauseman
Metallurgical Engineer, LaPlant-Choate Mfg. Co., Inc.

How hardenability studies on alloy steels are applied to plant and laboratory work was demonstrated in a talk by A. L. Kaye, manager, Alloy Bureau, Carnegie-Illinois Steel Corp., before the February meeting of the Cedar Rapids Chapter A.S.M.

Mr. Kaye first reviewed the early work done on hardenability, describing in detail the cross-sectional test whereby specimens were quenched in a number of media, giving a variety of cooling rates, and the depth of hardness obtained by taking hardness readings with a suitable hardness tester on a polished cross-section. The speaker then described the Jominy end quench test, stating that all the data obtained previously in a series of tests can now be obtained in one simple test.

He also stated that, since Janitzky and others have shown that fully hardened and tempered steels have the same physical properties if the tempered hardness is the same in the range of 100,000 to 200,000 psi. tensile strength, the Jominy test is a valuable aid with which to compare steels on the basis of hardenability when substitutes of alloy steels must be made on the basis of physical properties.

The speaker pointed out that, since there are many demands for hardenability information from consumers to accompany raw steel shipments, most alloy mills now cast suitable bars from which Jominy specimens are tested. The results show excellent agreement between cast and forged values for most alloy grades.

Carl Zapffe Describes Unpublished Research on Gases in Metals

Reported by John F. Kahles
Assistant Professor of Metallurgy, University of Cincinnati

The principal gaseous elements—oxygen, hydrogen and nitrogen—and their effects on ferrous and nonferrous metals were discussed by Carl A. Zapffe on March 8, when he addressed the Cincinnati Chapter on "Gas-Metal Systems." Causes and cures of gas attack on metals were discussed at intermediate temperatures, at high temperatures (porosity, backing up in the mold, etc. during solidification), and at ordinary temperatures with regard to hydrogen embrittlement in pickling, plating, enameling, welding and forging.

Included in his talk were a discussion of recent unpublished research on rapid recovery from hydrogen embrittlement, and an application of the author's new microscopic technique called "fractography" applied to the study of gases in metals.

New Films Teach Welding and Cutting

An industrial teaching aid in the form of a series of how-to-do-it slide films and accompanying instruction literature on oxy-acetylene welding and cutting operations has recently been completed by The Linde Air Products Co., New York.

Each slide film comes with three instructor's manuals and 25 student handbooks. The film is a succession of pictures, in regular 35-mm. motion picture film that can be projected on a screen one at a time as still pictures, while the instructor comments or answers questions. They may be obtained through any office of The Linde Air Products Co. at a nominal price.

International Nickel Creates Three New Research Sections

Three new sections have been created in the Development and Research Division of the International Nickel Co., Inc., New York. They are an Industrial Chemicals Section, to be headed by O. B. J. Fraser; a Corrosion Engineering Section, with F. L. LaQue in charge, and Iron and Non-Ferrous Casting Section, headed by Donald J. Reese.

Mr. Fraser has directed International Nickel's investigational work at Mellon Institute of Industrial Research, Pittsburgh, on certain problems in the chemistry and technology of nickel embracing particular attention to the preparation, properties and uses of nickel compounds. Through the Industrial Chemicals Section now established, Mr. Fraser can further expand the company's interests in this direction. He continues as director of technical service of International Nickel's mill products, a position he has held since 1934.

O. B. J. Fraser

The function of the newly created Corrosion Engineering Section under Mr. LaQue will be to coordinate the broad interests of the company and its customers in the choice and applications of nickel-containing alloys where resistance to corrosion is required. He is chairman of the American Coordinating Committee on Corrosion created to correlate American and British corrosion data.

As head of the Iron and Non-Ferrous Casting Section, Mr. Reese will coordinate more closely International Nickel's development work on cast iron, malleable iron, cast brass and bronze. He has just recently resumed his duties with the company's Development and Research Division after having been with the Steel Division of the War Production Board at Washington for almost three years.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

1-13. Minerals Used at Fontana Steel Plant. F. Conrad. *Mining Journal*, v. 28, Feb. 28, '45, pp. 6-7.

Minerals required to produce the 1,000 tons of molten iron poured each day by the blast furnace at the Kaiser Company's Fontana steel plant. In addition, other materials are required for the open-hearth and the foundry. Major sources of supply are located in four western states and in Mexico. Shipments by rail are unloaded by a rotary car dumper capable of handling 384 cars a day.

1-14. Principles of the Pedersen Alumina Process. H. Pedersen, H. Ginsberg and F. W. Wrigge. *Metall und Erz.*, v. 41, Feb. '44, pp. 32-35; April '44, p. 86. British Non-Ferrous Metals Research Association *Bulletin*, v. 25, Jan. '45, p. 6.

Recent development of the process, in which bauxite (including high silica material) is processed in the electric furnace with lime, the product being treated with sodium carbonate solution. Paper gives flow-sheet of the process and the relevant part of Rankin's silica-alumina-lime diagram. Reference to plants in Southern France, Norway, Russia and Sweden. For an English account of the Pedersen process based on this German paper, see *Industrial Chemist*, v. 20, no. 236, Sept. '44, pp. 498-500.

1-15. Flotation of Ores an Individual Problem. R. A. Pallanch. *Mining & Metallurgy*, v. 26, March '45, pp. 167-169.

Individual ingenuity is the prime requisite of a good operator. Ideas can be gained from another operator but often they do not work at home.

2. SMELTING AND REFINING

2-28. Electrolytic Manganese, I. *Metal Industry*, v. 66, Feb. 16, '45, pp. 101-102.

Production efficiency; crystal structure; future possibilities. 6 ref.

2-29. Review of Slag Control in 1944; Part II. W. O. Philbrook. *Industrial Heating*, v. 12, Feb. '45, pp. 262, 264, 266.

Slag-control programs as practiced in Wisconsin Steel Works, International Harvester Co., Chicago, and numerous plants from which data were available.

2-30. Melting and Evaporating Metals in a Vacuum. W. J. Kroll. Electrochemical Society Preprint 87-6, April 16, '45, 14 pp.

Factors involved in the melting and evaporation of metals at reduced pressures, and resulting lower temperatures discussed. Evaporation-condensation upward and downward from solid and from liquid states considered. Purification of metals and recovery of a metal from an alloy by vacuum distillation are discussed. Data on evaporation temperatures for various conditions at reduced pressures are tabulated. 29 ref.

2-31. The Effect of Deoxidation Procedure on the Properties of Chill-Cast Tin Bronze Melted Under an Oxidizing Flux. W. T. Pell-Walpole. Institute of Metals *Journal*, v. 71, Jan. '45, pp. 37-44.

Additions of phosphorus or aluminum or both were made before or after removing the flux from the molten metal. Deoxidation with phosphorus is fully effective, giving maximum density and mechanical properties, irrespective of the stage in the melting at which the addition is made, provided sufficient is added to insure a residual content of about 0.02% in the bronze. If the phosphorus is added before removing the flux, a considerable proportion is absorbed by the latter. Deoxidation with aluminum gives higher densities than phosphorus does, but inferior mechanical properties owing to entrapped oxide films. These occur most extensively in ingots deoxidized after removal of the oxidizing flux. The use of phosphorus together with aluminum does not eliminate the disadvantages of the latter and leads to no improvement in properties. 4 ref.

2-32. Bessemer Steel Production and Application. *Iron Age*, v. 155, March 22, '45, pp. 59-65.

Production and characteristics of killed bessemer steel; dephosphorized bessemer steel used for many products; future of bessemer steel for automatic screw machine products; conveyor degreaser made fire-safe.

2-33. Metallurgy of Liquid Steel. B. B. Rosenbaum. *Industrial Heating*, v. 12, March '45, pp. 438, 440, 442, 444, 446.

Part II: Physico-chemical considerations and slag control.

2-34. Modern Blast Furnace Design and Operation. James Dale. *Blast Furnace and Steel Plant*, v. 33, March '45, pp. 360-365.

Available volume between small and large bell; angle of large bell; McDonald deflector or distributing ring.

2-35. The Effect of Melting Practice on the Properties of Steel. J. A. Preston. *Blast Furnace and Steel Plant*, v. 33, March '45, pp. 366-368, 383.

Factors governing quality; oxidation; refining. (Paper delivered before the Australian Institute of Metals, Melbourne Branch, May 4, '44, and printed in *The Australian Engineer.*)

2-36. Non-Ferrous Metal Melting. Davidless Von Ludwig. *Industrial Gas*, v. 23, March '45, pp. 9-12.

Comparison of test bar castings made in oil and gas-fired crucible furnaces.

2-37. Miniature Smelting. G. H. Goodwin. *Iron & Steel*, v. 18, Jan. '45, pp. 6, 17.

Working model blast furnace.

2-38. Blast Furnace Gas—Wet-Washed or Dry-Cleaned? F. X. Gilg. *Iron and Steel Engineer*, v. 22, March '45, pp. 47-54.

Experience indicates that wet-washed gas, unless cleaned to 0.02 grain per cu. ft. or less, leaves deposits in the boiler which are more troublesome than those resulting from dirtier dry-cleaned gas.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-13; **2**-29-**33**-**34**-**35**-**38**-**39**-**40**-41; **4**-10; **6**-23-**28**; **7**-51; **9**-23; **10**-22; **12**-54; 15-7; **16**-**33**; **26**-57-66-76.

Cast Iron

3-41-47-50-55; **14**-68-73-74-80-87-90.

Cast Steel

12-40; **14**-85.

Wrought Carbon Steel

7-31; **9**-26-29-**36**; **10**-21; **19**-52-72-90-91; **22**-103-124-126-135-152-160; **23**-67.

Alloy Steel

3-37-38-45-51; **6**-29; **9**-32; **12**-53; **18**-60-62-64-69; **20**-71; **22**-135-137-154.

Stainless and Heat Resisting Steel

3-49; **6**-20; **7**-54; **13**-7; **20**-68; **22**-114-151-154.

Tool Steel and Carbides

5-9-10-11; **12**-47; **14**-69; **18**-60-70-71-72-73; **19**-53; **20**-69; **22**-149.

Ferro-Alloys

3-48; **26**-67.

General Non-Ferrous

2-36; **8**-39; **12**-43; **14**-72; **15**-8; **22**-116-121-140.

Aluminum

1-14; **3**-53; **4**-9; **7**-40-52; **8**-35; **10**-20; **12**-56; **14**-76; **19**-55-64-68-78-79-85-88; **20**-66; **22**-108-136-138-156-165; **23**-63-69-70-76-79-80-81-82-83-85; **24**-28; **26**-56-70-74.

Magnesium

3-39-46; **4**-8; **10**-17; **12**-41-56; **14**-67-76-82-94-97; **19**-88; **20**-82-96; **22**-98-121; **23**-69-76-79-80-83-85; **24**-27-28; **26**-71.

Copper, Brass and Bronze

2-31; **3**-43-44; **5**-10; **7**-36; **10**-18; **14**-71; **17**-15; **19**-74-85-93-98; **20**-83; **22**-115-121-125-128-141-163; **23**-60-71; **26**-58-62-63.

Nickel, Monel and Nickel Alloys

8-22-25-32; **19**-86; **22**-163.

Lead and Lead Alloys

8-31; **10**-21; **26**-59-64.

Tin and Tin Alloys

8-32; **10**-19-21; **14**-93.

Zinc and Zinc Alloys

7-45-50; **8**-35-36; **14**-93; **16**-34; **19**-61; **20**-94; **26**-65.

Miscellaneous and Minor Metals

3-40; **8**-23-27-28-34-37-40; **19**-95; **26**-60-68-69-72-73.

2-39. Blast Furnace Tuyeres. J. B. Fortune. *Iron & Steel*, v. 18, Jan. '45, pp. 7-9.

Methods of increasing life and overcoming abnormal losses.

2-40. The Blast Furnace Skip Hoist, II. Gordon Fox. *Iron and Steel Engineer*, v. 22, March '45, pp. 55-61.

Paper relates to adjustable-voltage control for blast furnace skip hoists.

2-41. Steel Ingots. *Iron and Steel*, v. 18, Feb. '45, p. 50.

Maintenance of uniform teeming speeds.

3. PROPERTIES OF METALS AND ALLOYS

3-37. Relationship Between Hardenability and Percentage of Martensite in Some Low Alloy Steels. J. M. Hodge and M. H. Orehoski. *Tool & Die Journal*, v. 10, Feb. '45, pp. 139-140.

Evaluates the relationship between hardenability on the 50% martensite basis and that based on higher percentages of martensite in low alloy steels. (Condensation of a paper presented before the annual meeting of the American Institute of Mining and Metallurgical Engineers, New York City, Feb. 19-22, 1945.)

3-38. Graphitization of Low-Carbon and Low-Carbon-Molybdenum Steels. H. J. Kerr and F. Eberle. *Welding Journal*, v. 24, Feb. '45, pp. 86s-122s.

Some typical conditions which illustrate pertinent facts with respect to the laboratory experiments, the testing procedure described and the results obtained. Summary of the conclusions at which the authors arrived presented.

3-39. An Exploration of the Problem of Superheating in Magnesium-Base Alloys. F. A. Fox and E. Lardner. Institute of Metals *Journal*, v. 71, Jan. '45, pp. 1-22.

Grain-refining effect is confined to alloys containing aluminum, and tendencies to grain coarsening are introduced if the superheating time is too long or the temperature too high. Data are given relating tensile properties to grain size in various aluminum-containing alloys. Microstructures of super-heated alloys differ characteristically from those of the unsuper-heated material, and this difference persists even after a solution treatment, the unsuperheated alloy giving a mixed grain size. Grain sizes are recorded for an alloy, superheated and unsuperheated, cast as rods of various cross-sections. Stirring just before casting does not eliminate the grain-refinement effect of the superheating. 6 ref.

3-40. Some Effects of Oxygen in Silver and Silver Alloys. J. C. Chaston. Institute of Metals *Journal*, v. 71, Jan. '45, pp. 23-35.

Oxygen-free silver containing 0.01 to 0.02% of metallic impurities is annealed in air; a zone of fine grains is formed directly beneath the surface, while in the interior of the metal recrystallization and grain growth proceed normally. No such zone is formed when this metal is annealed in vacuum or in hydrogen. When oxygen-bearing silver containing these traces of impurities is heated in hydrogen, however, the metal is embrittled by a reaction similar to that produced by hydrogen annealing tough pitch copper. The mechanism of these reactions has been followed by heating strips of silver exposed on the one side to oxygen and on the other to hydrogen. Neither grain-growth restraint nor hydrogen embrittlement is observed in very pure silver, and it is suggested that the effects in the less pure metal may be due to distributed particles of metallic oxides formed by internal oxidation. Alloys of silver with small amounts of aluminum or zinc are hardened for a small distance below the surface when annealed in air, apparently as a result of a similar mechanism. A "reversed precipitation" effect can also be produced if silver containing oxygen in solution is heated in the vapor of zinc, which presumably diffuses into the silver and combines with the oxygen in solution to form dispersed particles of zinc oxide which cause hardening. 8 ref.

3-41. The Making of High-Duty Iron Castings to Specification. E. Hunter. *Foundry Trade Journal*, v. 75, Feb. 1, '45, pp. 95-97.

Development of iron founding demands new properties in cast iron.

3-42. The Gassing and Degassing of Metals and Alloys. J. C. Chaston. *Metal Treatment*, v. 11, Winter '44-'45, pp. 213-218, 212.

Discusses the terms "gassing" and "degassing" as used by different technicians, notably in the foundry and by electronic engineers. Methods of degassing molten metals and the uses of gas-free metals. 13 ref.

3-43. New Corrosion-Resistant Precipitation-Hardening Alloy. *Industrial Heating*, v. 12, Feb. '45, pp. 302, 304.

New precipitation-hardening alloy claimed to possess exceptional uniformity in response to heat treatment has a nominal chemical composition of 60% copper, 20% nickel, and 20% manganese, and is designated as No. 720 Manganese Alloy. It is corrosion resistant, not differing greatly from the cupronickels.

3-44. Segregation in Babbitt. T. E. Eagan and W. R. McCrackin. *Metal Industry*, v. 66, Feb. 16, '45, pp. 103-105.

Casting procedures for white-metal bearings vary according to the caprice or facilities available at the plant. Tested with regard to their effect on unsoundness and found that segregation can be avoided by careful control. (Paper given to A. I. M. E.)

3-45. Graphitization of Low-Carbon and Low-Carbon-Molybdenum Steel. H. J. Kerr and F. Eberle. *Steel*, v. 116, March 19, '45, pp. 118, 120, 160, 162, 164.

Controlled graphitization tests develop much information on the service behavior of materials used in elevated temperature applications. Molybdenum additions to a steel found to exert a very definite resistance to graphitization of that steel. McQuaid-Ehn test described as valuable criterion of the graphitizing tendency of carbon and carbon-molybdenum steels in this A.S.M.E. report.

3-46. Grain Size and Properties of Sand-Cast Magnesium Alloys. R. S. Busk and C. W. Phillips. *Metals Technology*, v. 12, Feb. '45, T. P. 1771, 11 pp.

Data giving the relationship between grain size and mechanical properties. Data also included on the combined effects of grain size and microporosity. In addition, a short discussion of factors influencing the grain size of sand castings is included. 9 ref.

3-47. Modern Cast Iron. A. J. Milgate. Australian Institute of Metals: *Australian Engineer*, v. 44, Sept. 7, '44, pp. 29-35. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 74-A.

A brief story of the development of cast iron is followed by an account of some aspects of the manufacture of high duty cast irons of tensile strengths of the order of 25 tons per sq. in. Factors in cupola operation and inoculation processes are dealt with, and some of the practical difficulties associated with the production of high duty cast iron reviewed. Notes on heat treatment and flame hardening are included, and the more important physical properties are listed.

3-48. Thermodynamic Properties of Carbides of Chromium. K. K. Kelley, F. S. Boericke, G. E. Moore, E. H. Huffman and W. M. Bangert. United States Bureau of Mines. Technical paper no. 6627, 1944. Iron and Steel Institute *Bulletin*, no 109, Jan. '45, p. 87-A.

The preparation of the carbides of chromium is described, and the results of low and high temperature specific heat measurements are given; the data are correlated satisfactorily, and thermodynamic values and functions for the carbides are derived.

3-49. **Why Use Rustless Stainless Steel?** *Iron Age*, v. 155, March 22, '45, pp. 97-99.

How to select the proper stainless grade; how stainless is fabricated; comparison of stainless properties; electropolishing stainless steels.

3-50. **Cast Iron Metallurgy.** J. E. Hurst. *Iron & Steel*, v. 18, Jan. '45, pp. 14-17.

Developments in research methods and apparatus.

3-51. **Graphitization of Welded and of End-Quenched Carbon and Molybdenum Steels.** G. V. Smith and S. H. Brambir. *Welding Journal*, v. 24, March '45, pp. 153s-157s.

End-quenched specimens and welded samples of a series of carbon steels ranging from 0.15 to 0.80% carbon, and of low-carbon 0.5% molybdenum steels, some of which had been heat treated 4 hr. at 1300° F. immediately after welding with the aim of preventing graphitization, were examined for graphite after 1000, 2000 and 3000 hr. at 975 to 1050° F. 5 ref.

3-52. **Definitions of Tensile Properties.** *Industry & Welding*, v. 18, March '45, pp. 82-85.

When a metal part is overloaded, it suddenly stretches rapidly at a point called the yield point. Then it is permanently deformed, unbroken but bent out of shape. In actual service, the yield strength of a material is usually much more important than its breaking strength.

3-53. **Some Recent Developments in Engineering Materials.** Archibald Black. *Mechanical Engineering*, v. 67, March '45, pp. 190-198.

"Vanasil," a low-expansion aluminum alloy; aluminum-steel bonding; aluminum plating; refrigeration of heat treated aluminum alloys; porous chromium surfacing; die casting materials and practices; tin and lead coatings on steel; tinless solders; silver bearing and other babbitts; copper brazing methods; laminated metals; high nickel alloys; lost wax casting of metals; calcium; lithium. 112 ref.

3-54. **Electrolytic Manganese—II.** *Metal Industry*, v. 66, March 2, '45, pp. 136-137.

Allotropes; high manganese alloys; effect of impurities; heat treatment. 5 ref.

3-55. **Cast Iron Metallurgy.** J. E. Hurst. *Iron and Steel*, v. 18, Feb. '45, pp. 53-54.

Developments in research methods and apparatus.

4. STRUCTURE

Metallography and Constitution

4-8. **Metallographic Examination.** P. F. George. *Metal Industry*, v. 66, Feb. 9, '45, pp. 87-91.

Rating charts for massize compound, "pearlitic" precipitate, porosity and "burning" for cast magnesium alloys, grain size chart and a rating chart for massive compound in wrought alloys.

4-9. **X-Ray Diffraction Examination of Gamma Alumina.** M. H. Jellinek and I. Fankuchen. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Feb. '45, pp. 158-163.

Controlled heating experiments have been made on γ-alumina, and the products studied by both wide-angle and low-angle X-ray scattering methods. New lines in the wide-angle diagrams suggest a different unit cell from the accepted one. Both of these methods are used to evaluate crystallite and particle size. 13 ref.

4-10. **Ac_3 Point in Iron.** John K. Desmond. *Iron and Steel*, v. 18, Feb. '45, pp. 55-56.

Determination by a grain elimination method.

5. POWDER METALLURGY

5-7. **The Fused Salt Electrolysis for the Production of Metal Powders.** W. J. Kroll. Electrochemical Society Preprint 87-5, April 16, '45, 18 pp.

Production of relatively pure metal powders or metal-alloy powders by the fused electrolyte method. Three major metal products of the fused electrolyte industry are sodium, aluminum, and magnesium. In each case the temperature of the fused salt bath is decidedly above the melting point of the metal produced. Advantage of operating at lower bath temperatures and of getting a solid rather than a liquid product is offset by the difficulty in eliminating the entrained or adherent fused salt from the metal crystals. Examples cited to illustrate the fundamental reactions taking place at the cathode and at the anode when solid metals or alloys are being deposited from a fused salt bath. 60 ref.

5-8. **Powder Metallurgy. B. Applications, Uses and Trends.. J. H. Robinson.** Australian Institute of Metals: *Australian Engineer Science Sheet*, Sept. 7, '44, pp. 5-7. Iron and Steel Institute *Bulletin* no. 109, Jan. '45, p. 74-A.

The advantages of applying powder metallurgy to the manufacture of a wide variety of articles are outlined.

5-9. **Powder Metallurgy. A. Manufacturing Methods and Limitations.** J. H. Bull. Australian Institute of Metals: *Australasian Engineer Science Sheet*, Sept. 7, 44, pp. 2-4. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 74-A

Methods of manufacturing parts by powder metallurgy described. In some instances the pressing, sintering and sizing are done in separate operations each requiring its special plant, but in others such as making cemented carbide forming dies, the three operations can be combined by hot pressing the preheated powder.

5-10. **New Method of Tipping Tools.** *Western Metals*, v. 3, Feb. '45, p. 16.

Two outstanding silver-copper and one copper alloy used for tipping tungsten carbide and high speed steel tools now available in a fine powder, the product of the Eutectic Welding Alloys Co.

5-11. **Large Carbide Parts Formed by Hot Pressing.** *Western Metals*, v. 3, Feb. '45, p. 54.

Electric resistance heating employed. Develpment of a "hot press" method which incorporates in one single operation the three distinct processes of pressing, semi-sintering, and sintering.

6. CORROSION

6-20. **Intergranular Corrosion of Stainless Steel Welds.** William T. Tiffin. *Welding Journal*, v. 24, Feb. '45, pp. 125s-128s.

Where austenitic welds are subjected to high temperatures and pressures, a desirable structure may be produced by heat treatment. The heat treatment should involve a quench from a suitable temperature which should be followed by a normalizing or spheroidizing treatment. Where the possibility of failure exists in "in-service" welds of the above type, similar means may be used to lessen the chances of subsequent failure. Moreover, where a suitable welding procedure is adopted, heat treatment may not be necessary unless peening of the weld metal is resorted to.

6-21. **Equipping a Corrosion Laboratory.** F. K. McKean. *Canadian Mining & Metallurgical Bulletin*, No. 394, Feb. '45, pp. 86-93.

Accent placed on the equipment selected; mention made of laboratory procedure, and results of a few preliminary tests recorded. 9 ref.

6-22. **Properties of Pure Boiler Feedwater.** *Combustion*, v. 16, Feb. '45, p. 45.

Because of the avidity with which pure water, such as condensate, takes up impurities, iron and copper from the condenser, the heaters, feed lines and pumps are often taken into solution. This is in the form of ferrous hydroxide which is subsequently broken down, under heat in the boiler, into magnetic oxide of iron, hydrogen and water. It is believed to account for much of the corrosion often found on last-stage turbine blades, in feed pumps, feed lines and the black oxide deposits in boiler tubes.

6-23. **Corrosion of Steel Salt-Bath Pots by Molten Alkali Nitrates.** R. J. Box and B. A. Middleton. Iron and Steel Institute Advance Copy, Jan. '45, 8 pp.

The corrosion of steel containers of salt bath furnaces by molten alkali nitrates was kept under observation simultaneously in several factories over two to three years. The furnaces were used for heat treatment of aluminum alloys at about 380 and 495° C., with variations in the quality of steel used for the pot, the shape of the pot, and the type of salt employed. Details of analytical control found useful are given. Results obtained indicated that with commercially available salt of guaranteed purity (sodium chloride 0.3% max.) corrosion was negligible at 380° C., and proceeded only slowly at 495°. Where rapid attack took place the furnace design appeared to be a fairly prominent factor. For all practical purposes the use of ingot iron for the pot was a complete insurance against corrosion under the conditions described. The rate of increase of alkalinity of the melt was an index of the rapidity with which corrosion was taking place.

6-24. **Corrosion Ratings for Metals and Alloys.** H. D. Holler and R. A. Frye. *Westinghouse Engineer*, v. 5, March '45, pp. 56-59.

Weather forecasting and corrosion prediction have much in common. Neither can yet be done with high accuracy because both are fraught with so many interrelated and often unknown variables. In each field, experts have been steadily making headway; accurate predictions may not always remain outside scientific boundaries. Engineers of several organizations have pooled their experience with many commonly used metals and alloys. The resulting tables, although not absolute, can serve as guides for selecting the material most resistant to atmospheres (outdoor or industrial) or to sea water, paying particular attention to restrict their use to specific conditions.

6-25. **Weather-Proof Revolution.** Edwin Laird Cady. *Scientific American*, v. 172, March '45, pp. 145-146, 148.

Our armed forces needed containers that could withstand immersion in salt water and pass unscathed through the rough-and-tumble of battle. To meet this need the industry pooled its knowledge and trade secrets. The new weather-proof packaging will have many uses after the war.

6-26. **Standardization of the Salt Spray Corrosion Test.** *Products Finishing*, v. 9, March '45, p. 36.

Salt spray test can be used in the initial inspection of supplies to insure adequate protective surface treatment of all packing containers.

6-27. **Rust Prevention.** G. W. Pressell. *Industry & Power*, v. 48, March '45, pp. 70-72, 165-167.

Adequate knowledge of the causes and prevention of corrosion will help in protecting privately owned equipment during reconversion and will facilitate the preparation of idle government machines for shipment or storage.

6-28. **Recommendations for Using Steel Piping in Salt Water Systems.** Paul Fifield. American Society of Naval Engineers *Journal*, v. 57, Feb. '45, pp. 1-20.

Types of corrosion affecting iron and steel; corrosion resulting from direct action of salt water; corrosion rates in still water; corrosion rates in flowing water; corrosion rates in aerated water; potential difference between anode and cathode; relative areas of anode and cathode; conductivity of the electrolyte; circuit resistance; proximity of anode and cathode; designing to minimize galvanic corrosion; eliminate the electrolyte; select materials of least potential difference; decrease the area of the cathode relative to the anode; use "waster pipes"; fouling by marine growths; pipe fouling by corrosion products; effectiveness of corrosion precautions.

6-29. **Corrosive Solutions.** W. E. Pratt. *Iron & Steel*, v. 18, Feb. '45, pp. 45-49, 52.

Effects of oxygen exhaustion on high nickel-chromium-molybdenum alloy steels. 4 ref. (Condensed from a paper presented at a recent meeting of Electrochemical Society in Buffalo, N. Y.)

6-30. **A Laboratory Machine for Investigating Corrosion of Bearings.** S. K. Talley, R. G. Larsen, and W. A. Webb. *Industrial and Engineering Chemistry* (Analytical Edition), v. 17, March 45, pp. 168-175.

Machine which simulates the more important mechanical factors leading to corrosion of bearings, and permits a study of factors which control the appearance and extent of bearing corrosion. Metallographic examination of corroded bearing sections indicates that the laboratory corrosion test specimens are nearly free of unwanted mechanical destruction and that corrosion penetration is more regular than in engine bearing specimens. Of the operating factors affecting bearing corrosion, temperature has been found to be especially important. 4 ref.

7. CLEANING AND FINISHING

7-31. **Porcelain Enamel on Steel Components in the Postwar Era.** G. H. McIntyre. *Steel Processing*, v. 31, Feb. '45, pp. 100-102.

Porcelain enamel; raw materials; acid resistance; use of enamel coatings; improved enameling steels.

7-32. **The Pickling of Steels, V.** Edward W. Mulcahy. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 257-260, 261.

Bulk storage of acid.

7-33. **Safe Operation of Solvent Degreasers.** L. P. Litchfield. *Iron Age*, v. 155, March 1, '45, pp. 58-62.

In spite of bad practices in many plants it has been proved that degreasing can be efficient, economical and entirely safe, if a few simple rules are followed. The few instances of trouble have been traced to a lack of knowledge and understanding of the properties of the solvent, or the proper operation of the equipment, both phases of which the author covers in this article.

7-34. **Cataphoresis and Alundum Coatings.** E. S. Bidgood and George H. Kent. Electrochemical Society Preprint 87-4, April 16, '45, 9 pp.

Practical problems involved in applying alundum coatings to certain radio tube parts, in particular to heaters. Reclamation and the control of particle size of alundum discussed. Outline of the various operations and difficulties encountered in heater manufacture. Discussion of the use of cataphoresis in applying alundum coatings and experimental data conclude the paper.

7-35. **Barrel Finishing.** R. MacNair. *Metal Industry*, v. 66, Feb. 16, '45, pp. 98-100.

Deburring, smoothing, burnishing, special processes. Application of the tumbling process to various articles for which it is eminently suitable.

(Continued on Page 7)

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), O.

Subscriptions one dollar a year. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless.....*Editor*
M. R. Hyslop.....*Managing Editor*

Cleveland, Ohio—April, 1945
Volume XVIII Number 4

Sea Water Corrosion Varies With Local Conditions Larrabee Tells Montreal

Reported by F. G. Wayman
Chemist, The Steel Co. of Canada, Limited

"Corrosion of Steels in Marine Atmosphere and in Sea Water" was the subject of an address given by C. P. Larrabee, Research Laboratory, Carnegie-Illinois Steel Corp., at the monthly meeting of the Montreal Chapter on March 7. Mr. Larrabee's talk was supplemented with slides showing results of extensive tests carried out during the past 15 years.

The corrosion rate of an unprotected steel has been found to be dependent upon its composition under various test conditions and at any given location. The low alloy high strength steels with superior corrosion resistance in industrial atmosphere also appear to be more resistant in marine atmospheres but to varying extents. The exact degree of corrosion resistance superiority of an alloy steel over a plain steel can be found only by actual tests which simulate service conditions as closely as possible.

Slight rusting usually mars the appearance of the lower grades of stainless steel in seacoast atmospheres but this is only a superficial attack believed to have little or no effect on the strength. An untarnishable steel can be obtained by employing a high alloy content but a high cost is attendant. Zinc coated steel products are quite satisfactory under many conditions and are worthy of consideration in any proposed service.

The attack on all steels immersed in sea water varies with local conditions and, in the majority of cases, the substitution of the low alloy steels can be justified only by tests which closely resemble service conditions. The rate of attack on steels exposed between high and low tides varies with the locality, pollution of the water, and oil, the presence of which may form a protective coating. In warm, humid atmospheres corrosion may be accelerated appreciably.

Pitting can be substantially lessened by the presence of 2 to 3% molybdenum in 18-8 chromium-nickel steels. Steels containing 25% chromium and 20% nickel are reasonably immune to excessive pitting attack.

A film, "Steel for Victory," presented through the courtesy of United States Steel Export Co., completed the evening's program.

New Films Help Teach Soldering Techniques and Basic Shop Safety

By Lyne S. Metcalfe

Two new training films of interest to the metal industries are announced by The Jam Handy Organization, Detroit, as follows:

"Soldering": A discussional type slidefilm, comprising 92 teaching pictures. Sequences include: Uses for soldering, definition, methods and fluxes, types and applications, heat sources, steps in soldering, preparing the bit, soldering cables, terminals, taps and splices, soldering sheet metal, and safety precautions.

"Basic Shop Safety": Series of eight discussional type slidefilms, suited to any metal working shop or plant, to help promote safety education and to be integrated with the shop safety program.

Shortage of Forging Hammers Promotes Centrifugal Casting

Reported by P. H. Tomlinson
Farrel-Birmingham Co., Inc.

About 100 members of the New Haven Chapter A.S.M. braved New England fog and ice to come to Derby on Feb. 22 to hear Arthur E. Schuh, director of research, U. S. Pipe & Foundry Co., deliver an excellent illustrated talk on the art of producing castings by the centrifugal method.

Dr. Schuh briefly traced the history of centrifugal casting, noting that the art is by no means new, centrifugal castings having been made before the turn of the century. However, it was not until the advent of World War II that the science of centrifugal casting was rapidly developed along with the art. This situation was brought about by the scarcity of forging hammers and accordingly the steel casting industry was called upon to fill the breach.

Centrifugal casting may be divided into three types: (1) Centrifuging, (2) semi-centrifugal casting and (3) true centrifugal casting. In centrifuging, molds are spaced around the periphery of revolution and the metal is flowed from a central down-gate into isolated molds through radial gates.

Semi-centrifugal casting is used for wheels, gears, or other disk-shaped parts. The mold is spun about its own axis, and the centrifugal force generates pressure from the center outward to the rim section. In true centrifugal castings, the mold is spun about its own axis and at least a part of the useful interior surface is shaped by centrifugal force without a center core.

The speaker illustrated his talk with numerous slides showing actual production of castings using each of the above three methods. He also displayed a number of samples showing the possibilities and limitations of centrifugal casting. Among these were samples of tubes having an outer layer of steel and an inner layer of non-ferrous metal as well as a tube having an outer layer of steel and an inner layer of high silicon corrosion resistant iron.

The speaker was modest in his claims for centrifugal castings, being content to note that a centrifugal casting is in many cases equal to the forging that it replaced; in some cases there is evidence that the centrifugal casting may be superior. It was the opinion of the speaker that centrifugal casting will find its natural level by complementing forgings and statically cast castings rather than by replacing them.

Seasholtz Talks on Interrupted Quench

Reported by C. A. Nagler
Instructor of Metallography, University of Minnesota

For the same hardness, better physical properties are obtained by martempering and austempering than by conventional quenching methods, was a general conclusion left with the audience at the February meeting of the North West Chapter, when A. P. Seasholtz, metallurgical engineer of E. F. Houghton & Co., spoke on "Interrupted Quenching." Mr. Seasholtz's talk has been reviewed previously and was published in full in the October 1944 issue of METAL PROGRESS.

Convention Papers Invited

A CORDIAL INVITATION is extended to all members of the American Society for Metals to submit technical papers to the Publication Committee to be considered for the annual convention of the Society usually held in October. Arrangement of the technical program and educational lectures for the convention are proceeding as usual, on the possibility that conventions and expositions will again be permissible by that time.

Three copies of the paper accompanied by three sets of drawings and illustrations must be sent to the National Office in Cleveland to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, not later than June 1, 1945. Headquarters should be notified immediately of your intention to submit a paper.

Helpful suggestions for the preparation of technical papers will be sent to all who indicate their intention to submit papers for the program.

Comstock Is Worcester Speaker

Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

Leaders at the January meeting of Worcester Chapter (left to right): A. J. Pepin, chief metallurgist, Wyman-Gordon Co.; John W. Higgins, president and treasurer, Worcester Pressed Steel Co.; John A. Comstock, materials control engineer, Pratt & Whitney Aircraft Co., East Hartford, Conn., and J. Adams Holbrook, vice-chairman of the Chapter. Mr. Comstock, who spoke on "Production Heating Problems Encountered on Small Parts," was introduced by Mr. Pepin. Mr. Higgins, who talked on the historical background of his company, was introduced by Arnold L. Rustay, program chairman. Vice-chairman Holbrook presided.

American Malleable Production Exceeds a Million Tons Yearly

Reported by Elmer H. Snyder
Chief Metallurgist, Austin-Western Co.

On Feb. 8 Harry A. Schwartz of the National Malleable and Steel Casting Co. talked before the Chicago Chapter of the A.S.M. on "Malleable Iron and Its Modifications".

Dr. Schwartz covered the subject from the first American blackheart malleable iron made by Seth Boyden in 1826 down to present-day grades 32510 and 35018, pearlitic malleables, and alloy additions such as boron which greatly accelerate graphitization when present to the extent of only 0.001%.

Grade 32510 has a tensile strength of 50,000 psi. and an elongation of 10% while for grade 35018 these values are 53,000 and 18 respectively.

The pearlitic malleables, although somewhat less ductile than the older ferritic type, have advantages of greater hardness, strength and wear resistance. They may be produced by interrupted graphitization, heat treatment of completely graphitized malleable and by alloying. The present American production of malleable iron probably amounts to over 1,000,000 tons per year.

"X-Rays in Industry" Is Van Horn's Subject at Detroit Meeting

Reported by Eugene V. Ivanso
Metallurgical Engineer, Steel Sales Corp.

The peripatetic national officers of the A.S.M., Kent R. Van Horn, president, and William H. Eisenman, secretary, stopped off in Detroit on Feb. 12 during their nation-wide tour to provide the feature attraction at "National Officers' and Sustaining Members' Night".

Before the representatives of some 65 sustaining company members and a goodly crowd of regular members and guests, Bill Eisenman held forth in his usual zestful manner. The group was brought up to date on national society affairs, gentleman farming and the rigors of wartime traveling, the discourse being of course deftly sprinkled with "bon mots" a la Eisenman.

The gathering was next treated to a technical presentation by Dr. Van Horn, given with such elan and clarity that nary a soul gave a thought to the slumberous potentialities of the seats and appointments in the luxurious auditorium of the Horace A. Rackham Educational Building. The field of "X-Rays in Industry" was given brief but complete treatment with respect to both radiography and X-ray diffraction analysis, and the few loose ends were picked up during the ensuing discussion period.

Despatch Opens Sales Office in Chicago

Despatch Oven Co. has opened a new sales and field engineering office in the LaSalle Wacker Bldg., Chicago. The new office will augment the present engineering staff at Minneapolis and offer industrial oven and furnace engineering facilities to manufacturers. John H. Watson is general manager.

Metal Literature Review—*Continued*

7. CLEANING & FINISHING *(Cont.)*

7-36. **Metallic Flake Pigments.** Stanmore V. Wilson. *Organic Finishing*, v. 6, Jan. '45, pp. 12-17.
Gold bronze. 4 ref.

7-37. **The Roller Coating Process.** Fred S. Bailey. *Organic Finishing*, v. 6, Jan. '45, pp. 20-23.
Types of coaters; spot coating machine; applications.

7-38. **Safe Spraying Practices, I.** *Organic Finishing*, v. 6, Jan. '45, pp. 25-27, 31-32.
Spray coating systems; pressure tank system; fixed pipe system; gun receptacle system; gravity feed system; precautions; storing, mixing and handling finishing materials; location of spraying operations; spray booths.

7-39. **Electrostatic Spraying and Detearing.** H. Forsberg. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 298-300, 305-306, 310.
Complex metal parts painted automatically, economically, and with superior finish by spraying in an electrostatic field. Similar desirable results attend the electrostatic detearing of parts dipped in paint. (From *Iron Age*).

7-40. **Anodizing Aluminum.** Gilbert C. Close. *Industrial Finishing*, v. 11, Feb. '45, pp. 42, 44, 46, 48, 52-53.
Theory and application.

7-41. **The Chemistry of Polishing Wheels.** Henry R. Power. *Products Finishing*, v. 9, March '45, pp. 32-34.
Polisher can carry on his work with non-siliceous abrasives exactly as the grinding shop has been successful in displacing the sandstone wheels with modern grinding wheels carrying the more efficient and more hygienic electric furnace abrasives.

7-42. **Acid Fume Extraction.** Edward W. Mulcahy. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 61-64, 67.
Only effective way to extract acid fumes so as to neutralize their potential damaging effect to plant is to collect them at their source—the tank top. This can be accomplished either with a hood over the tank connected by trunking to a fan or with high velocity intake slots running the whole length of the tank side, at a height above the liquor level governed by the nature of the fumes and method of pickling.

7-43. **Metallizing Non-Conductors.** Samuel Wein. *Metal Finishing*, v. 43, March '45, pp. 103-106.
A metallic salt is dissolved in an "essential oil" and applied to the given surface such as glass, ceramic, mica, etc., and subjected to elevated temperature whereupon the metallic paint is reduced to metal and fused into the insulating material. A metal powder or a metallic salt is mixed with a suitable flux and an essential oil, applied to the given surface and subjected to an increase in temperature, fusing it to the given material. Metal powders mixed into suitable lacquer medium, applied to the given surface and fused thereto at elevated temperature. Materials forming a part of the porcelain used as a medium into which may be incorporated the metal salt or metal powder, and formed into the given item, such as a vase, etc., and this is then "fired" in the kiln. 30 ref.

7-44. **Barrel Finishing.** R. MacNair. *Metal Industry*, v. 66, Feb. 23, '45, pp. 114-116.
A finish suitable for plating and metal coloring can be produced by the procedure detailed.

7-45. **Galvanizing.** W. H. Spowers, Jr. American Society of Naval Engineers *Journal*, v. 57, Feb. '45, pp. 78-90.
Some principles of zinc coating; pickling; water; flux wash; effect of alloy layers on bonding; galvanizing; formation of zinc dross; centrifugal galvanizing; investigation on use of sulphuric acid for pickling; method of procedure; results.

7-46. **Barrel Finishing.** R. MacNair. *Metal Industry*, v. 66, March 2, '45, pp. 134-135.
Describes the methods of dealing with domestic mincers, nails, chains, jewelry and pins, etc.

7-47. **Many Factors Govern Selection of Abrasives for Blast Cleaning.** D. C. Turnbull. *American Machinist*, v. 89, March 1, '45, pp. 98-101.
Whether to use sand, steel shot or grit depends upon material to be cleaned, equipment used and type of finish to be attained.

7-48. **Coatings for Fresh Water Tanks in Submarines.** Roy F. Perry. *Industrial Finishing*, v. 21, March, '45, pp. 62, 64, 66.
Brown metallic paint, clear phenolic varnish, cement wash, zinc dust, electrical treatment.

7-49. **A Film Is Born.** Paul O. Blackmore. *Industrial Finishing*, v. 21, March '45, pp. 40, 42, 44, 46, 48, 50, 52, 56, 60.
Drying by polymerization.

7-50. **Production Galvanizing of Ammunition Cases.** Allen T. Baldwin. *Iron Age*, v. 155, March 8, '45, pp. 68-70.
Use of hot galvanizing to provide a protective coating for steel ammunition cases made to hold 40-mm. anti-aircraft shells for the U. S. Navy.

7-51. **The Pickling of Steels—Part V.** Edward W. Mulcahy. *Sheet Metal Industries*, v. 21, March '45, pp. 437-442.
Lifting and agitating mechanism.

7-52. **Automatic Dipping Setup.** *Steel*, v. 116, March 12, '45, pp. 118, 168.
Millions of rivets and small aluminum alloy parts daily are given corrosion preventive treatment by Willow Run's "alrok" process, a combination of chemical reaction resulting in oxidized finish on parts and huge high production unit of conveyor, baskets and dipping tanks all in one.

7-53. **A Wartime Finish With Peacetime Applications.** R. H. Minton, Jr. *Industrial Gas*, v. 23, March '45, pp. 13, 31-32.
The various steps of the black oxide process can be followed by a flow diagram.

7-54. **Surface Film on 18-8 Stainless.** *Iron Age*, v. 155, March 15, '45, p. 57.
Enrichment of chromium as chromic oxide in the surface film and its dependence on the degree of polish are associated with surface flow during polishing.

7-55. **Some Observations on the Structure of Acid Resistant Vitreous Enamels for Chemical Plant.** G. E. Charlish and E. J. Heeley. *Foundry Trade Journal*, v. 75, Feb. 15, '45, pp. 127-130.
High frequency spark test and the detection of voids in enameled coatings.

7-56. **Vapor Phase Degreasing, II.** J. M. Payne. *Die Casting*, v. 3, March '45, pp. 67-68, 70.
Basic principles of vapor phase degreasing including the class type of solvents used and variations currently incorporated in machine design. Governing factors which must be considered in selecting the machine type best suited to die castings are discussed. Operating hints with a view to securing optimum solvent economy and elimination of health hazards are suggested.

8. ELECTROPLATING

8-21. **Adjustable Anode Rack Aids Plating.** *Iron Age*, v. 155, March 1, '45, p. 57.
Faster plating of irregularly shaped parts and more uniform metal deposits are being achieved through the use of a new adjustable anode rod.

8-22. **Electroplating Nickel From Low pH Electrolytes.** E. E. Halls. *Metal Treatment*, v. 11, Winter '44-45, pp. 235-243.
Development of low pH values in electroplating baths, having for their object speed of operation in the production of coatings of quality equal to those normally produced.

8-23. **Silver Plating.** J. M. Sprague. *Metal Industry*, v. 66, Feb. 16, '45, pp. 106-108.
Adherent silver coatings for engineering purposes. (Electrodepositors' Technical Society.) 3 ref.

8-24. **Determining the Area of Parts to Be Plated.** Joseph Haas. *Metal Finishing*, v. 43, March '45, pp. 94-96.
Electrodepositing a metal to a specified amount per article or unit of articles does not present any difficult problem. All that is required is simple multiplication, knowing the total amount of metal to be deposited, and then calculating the time at a certain amperage to obtain that quantity of metal, making allowances for the current efficiency of the solution. Problem presented.

8-25. **Continuous Plating of Fine Steel Wire with Nickel.** James H. Conolly and Richard Rimbach. *Metal Finishing*, v. 43, March '45, pp. 97-99, 101.
Due to the scarcity of nickel a nickel-plated steel wire is used today in place of solid nickel wire for tungsten filament supports in incandescent lamps. The steel wire passes through a concentrated Watts' nickel plating bath at the rate of 12 ft. per min. (90 mm. per sec.) at a current density of 200 to 600 amp. per sq. ft. (22 to 65 amp. per sq. dm.); a bath pH of 2.0 and a bath temperature of 60°C. A very adherent nickel deposit (0.005 mm.) is obtained that may be safely subjected to sharp bends and which satisfactorily protects the steel basis during the life of the lamp.

8-26. **Automatic Temperature Control in the Plating Shop.** *Sheet Metal Industries*, v. 21, Feb. '45, p. 261.
Description of temperature regulator illustrated which has been successfully used in a big shop, containing plating tanks of all types (nickel, copper, tin, zinc) and caustic and alkaline tanks.

8-27. **Analysis of Silver Plating Solutions.** J. N. Gregory and R. R. Hughan. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Feb. '45, pp. 109-113.
Methods for the electrometric determination of free cyanide and argenticyanide in silver plating baths are described. Both ions can be determined by the same run of the buret with silver nitrate solution. The end points are detected by null-point readings on a galvanometer. The method requires inexpensive equipment and is very rapid and easy to carry out. The effect of other ions often found in electroplating solutions has also been investigated. 5 ref.

8-28. **Plating and Painting Switchboard Parts.** Fred M. Burt. *Products Finishing*, v. 9, March '45, pp. 24-26, 28, 30.
Approximately 30% of weight of material may be saved in the bus bars by increasing the conductivity through silver plating, with the added advantage of having closer, more secure and finer contacts between plated surfaces as compared with unplated contacts.

8-29. **A Rotating Cathode Cell for Strip Plating Evaluation and Control.** D. A. Swalheim. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 68-71.
Design of the duPont rotating cathode cell; examples of applications of the cell and of the results obtained; current-voltage characteristics; voltages required to produce 0.5, 0.75 and 1.0 lb. per base box tin plate; bath composition; relationships between voltage and current density at constant strip speed; effect of chloride concentration on voltage-current density relationship; effect of temperature on the voltage-current relationship; effect of tin content on cathode current efficiencies. 7 ref. (Presented at the 86th General Meeting, The Electrochemical Society.)

8-30. **Zinc Plating for Lubrication in Deep Drawing.** H. A. Shepard. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 85-86.
Bath operating conditions; economy in working necessary; filtration and agitation of electrolyte is important. (From American Electroplaters' Society *Monthly Review*.)

8-31. **Lead Plating.** O. Wright. *Metal Industry*, v. 66, March 2, '45, pp. 138-140.
Application to heavy duty bearings. Advantage claimed for this type of bearing is a reduction in "running-in" time.

8-32. **High-Speed Alkaline Tin Plating.** Martin M. Sternfels and Frederick A. Lowenheim. *Metal Finishing*, v. 43, March '45, pp. 100-101.
Potassium stannate solutions promise to overcome a major objection to alkaline tin plating—the inherently slow plating speed obtainable with the sodium stannate bath. It will do all the sodium stannate bath can do, and do it more quickly with the expenditure of less power. It possesses other minor advantages over the sodium bath as well, including greater freedom from sludge formation, better conductivity, and more favorable solubility relationships.

8-33. **A Simple Automatic Level Control for Plating Tanks.** Joseph B. Kushner. *Metal Finishing*, v. 43, March '45, pp. 102, 106.
The simple liquid level controller for plating and cleaning tanks described; proved of value in a number of installations, particularly in gold plating work, but it is as readily useful wherever warm or hot solutions are employed for plating or cleaning.

Metal Literature Review—*Continued*

8. ELECTROPLATING (*Cont.*)

8-34. Chrome Plating of Piston Rings Increases Corrosion Resistance. D. M. Smith. *American Machinist*, v. 89, March 1, '45, pp. 112-113.

Controlled plating of the face surfaces of rings extends their life three to four times. The plated rings are subjected to thorough laboratory inspection. Gives plant procedure.

8-35. Plating Millions of Die Castings Economcially. *Die Casting*, v. 3, March '45, pp. 54-55, 58, 60, 62-63.

Copper, nickel, "Moly Black," gold and other finishes applied, especially on zinc alloys, but aluminum alloys are also given electrolytic and other coatings on a high production basis.

8-36. Bright Zinc Plating. S. Wernick. *Sheet Metal Industries*, v. 21, March '45, pp. 443-446.

Bright zinc plating; cadmium versus zinc plating; bright zinc plating processes; chemical control; electrolytic impurities; anodes. 7 ref.

8-37. Electroplating: Modern Equipment and Technique. H. Silman. *Sheet Metal Industries*, v. 21, March '45, pp. 467-475, 496.

Chromium plating. 12 ref.

8-38. Economy of Chromic Acid in the Electrodeposition and Metal Finishing Industries. *Sheet Metal Industries*, v. 21, March '45, pp. 494-495.

Main uses of chromic acid in the electrodeposition and metal finishing industries are: (a) Chromium plating; (b) anodizing; (c) non-electrolytic immersion treatments such as pickling and metal finishing. Possible ways in which the consumption of chromic acid in the above processes may be reduced are outlined.

8-39. Superimposed AC on DC. G. W. Birdsall. *Steel*, v. 116, March 12, '45, pp. 108-109, 120, 123.

Permits plating outputs to be doubled or tripled when used with newly developed metallo-organic solution additions; also affords improved covering power in recesses and a uniformly greater brilliance; thus makes available new levels of performance and economy in electrodeposition of zinc, cadmium and copper.

8-40. Flash Chrome Plating. C. L. Tanner, *Automobile Engineer*, v. 35, Feb. '45, pp. 67-68.

Hard chrome plating; extreme brittleness; flash plating process; reduced friction; applications to cutting tools; metal stampings; flash chrome effective as gage finish; applications to engine parts. (Presented before the American Society of Mechanical Engineers.)

9. PHYSICAL & MECHANICAL TESTING

9-21. Increasing Fatigue Life of Heat Treated Gears. *Iron Age*, v. 155, March 1, '45, p. 63.

Increase the resistance to fracture of the teeth of gears by following measures: 1. Chamber at the shoulder of the teeth increased. 2. Thickness of the rim altered. 3. Grooves caused by grinding and polishing in the tooth gullet removed, the marks of the final polishing running at right angles to the teeth.

9-22. Wheels of Worth. L. K. Sillcox. *Scientific American*, v. 172, March '45, pp. 165-166, 168.

An abbreviated consideration of the effects of heavy stresses and strains on both wheels and rails. How much wheel area touches the rail?

9-23. Air Hardenability of Steel. C. B. Post, M. C. Fetzer, and W. H. Fenstermacher. *Steel*, v. 116, March 5, '45, pp. 120-121, 132, 134, 136, 139.

Data originally prepared for the American Society for Metals can be used by toolmakers and heat treaters in the selection of air hardening steels. New method of testing described.

9-24. A New Machine for Measuring Wear Resistance of Walkway Materials. A. W. Cizek, D. H. Kallas and H. Nestlen. American Society for Testing Materials *Bulletin*, No. 132, Jan. '45, pp. 25-28.

The wear test machine in its present form offers a high degree of versatility in so far as the factors such as speed, amount of lift of specimen, amount of abrasive, size and kind of abrasive, material on the face of the abrasion disk, ratio of specimen shaft speed to abrasion disk speed, size of the specimen, configuration of the specimen, and load on the specimen, can be varied independently to give the combination of conditions most closely approximating actual service. 7 ref.

9-25. A Suggested New Parameter for Fatigue Strength Analysis. Victor Seliger. American Society for Testing Materials *Bulletin*, No. 132, Jan. '45, pp. 29-31.

A new parameter, $K_{fs} \cos R$, is suggested for use in the presentation of fatigue strength properties and in the analytical development of fatigue strength theory. Its advantages and possible limitations are discussed in the light of presently available data. The need for more developments such as this is emphasized.

9-26. Relationships Between the Magnitude of the Notched-Bar Toughness and the Type of Fracture in the Bend Test on Weld Metal. K. Albers. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 87, Oct. 30, '43, pp. 677-682. Iron and Steel Institute *Bulletin*, no, 109, Jan. '45, p. 85-A.

The value of the notched-bar impact test and of the bend test on weld metal as methods of determining the weldability of structural steels is discussed. Impact tests were carried out on specimens which had been subjected to various degrees of cold work, but no relationship was found between the impact values and the type of fracture obtained in the bend test on weld metal.

9-27. The Sphere of Application for Microhardness Testing. E. B. Bergsman. *Teknisk Tidskrift*, v. 74, Nov. 11, '44, pp. 1297-1303. (In Swedish.) Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 86-A.

The applications of scratch and indentation microhardness testing machines are reviewed. It is shown that the ratio of the number of cracks round the impression to the impression area or depth can be used as a measure of the brittleness of the material tested.

9-28. Bending of Curved Thin Tubes. Leon Beskin. *Journal of Applied Mechanics*, v. 12, March '45, pp. A1-A7.

Stress distribution in curved tubes, and its influence on the rigidity, are examined in the case when the ratio of the radius of the center line to the radius of the tube is great. It is shown that, when this ratio is small, the results relative to rigidity remain fairly accurate, while the results relative to stress distribution are incorrect and require a more complete analysis.

9-29. Yielding and Fracture of Medium Carbon Steel Under Combined Stress. E. A. Davis. *Journal of Applied Mechanics*, v. 12, March '45, pp. A13-A24.

Results of combined stress tests on a medium carbon steel are presented. Particular attention has been paid to the magnitude and the distribution of the stresses and strains at the instant preceding fracture. The effect of the shape of the test specimen and the isotropy of the material upon the rupture properties has also been investigated.

9-30. A New Design Criterion for Wire Rope. D. C. Drucker and H. Tachau. *Journal of Applied Mechanics*, v. 12, March '45, pp. A33-A38.

Indicates that a dimensionless bearing-pressure variable $B = 2T/UdD$ is of prime importance in the proper choice of wire rope. Its significance is evident in the plot of life (number of cycles to failure) against this bearing-pressure ratio B, which shows a well-defined curve for several ordinary lay 6x37 ropes. Also, the scatter in test results for many different ordinary lay ropes of 6x19 and 6x37 construction is less than might be expected from the considerable variation in testing procedure and the wire rope itself. 14 ref.

9-31. Shear Strength of Copper Brazed Joints. N. L. King. *Iron Age*, v. 155, March 8, '45, p. 71.

Tests and results briefly outlined.

9-32. Impact Resistance vs. Hardness of Aircraft Low Alloy Steels. John M. Thompson. *Iron Age*, v. 155, March 8, '45, pp. 72-74.

A definite relationship between resistance to impact and hardness for SAE X4130, 4140, and X4340 steels is established on the basis of empirical data. Effects of various heat treatments on salt quenched and oil quenched materials compared.

9-33. The Influence of the Magnitude of Cross-Sectional Area on Fatigue Strength. W. Buchmann. *VDI Zeitschrift*, v. 87, no. 21/22, May 29, '43, pp. 325-327. *Engineers' Digest* (American edition) v. 2, March '45, pp. 136-137.

Influence of the "scale factor," i.e., the influence of the magnitude of cross-sectional area on fatigue strength as test samples have, generally, lesser dimensions than the actual parts. With steel, the flexural fatigue strength of a rod 100 mm. diameter is about 60% of that for a rod of 15 mm. Tests on light metals; scale factor and stabilizing effect.

9-34. Deformation and Strength of Metals Subjected to Long-Period Stress. A. Thum and K. Richard. *Zeitschrift des VDI*, v. 87, no. 33/34, Aug. 21, '43, pp. 513-520. *Engineers' Digest* (American edition), v. 2, March '45, pp. 130-133.

Creep properties; strength characteristics in the creep range; the deterioration characteristic; the notch effect; short period tests.

9-35. Effect of Vibration on Brackets, Fastenings. A. M. Wahl. *Machine Design*, v. 17, March '45, pp. 141-146.

Fatigue strength of screw fastenings for bracket-mounted overhanging loads has been found to be a limiting factor in design. This is because the flexibility of the bracket rim imposes flexural stress on the fastenings, resulting in early failure. (Abstract of American Society of Mechanical Engineers report.)

9-36. The Biaxial Fatigue Strength of Low-Carbon Steels. George K. Morikawa and LeVan Griffis. *Welding Journal*, v. 24, March '45, pp. 167s-174s.

Thin-walled cylindrical specimens of structural steel have been investigated in welded and unwelded forms, and in annealed and normalized states, under cyclic combined tensile stresses, and with various constant principal stress ratios of circumferential stress to axial stress from 0 to 2. Fatigue data are presented which show that there is only slight effect of principal stress ratio upon the endurance limit for this S.A.E. 1020 steel. 4 ref.

10. ANALYSIS

10-17. Colorimetric Methods for the Analysis of Magnesium-Base Alloys. V. A. Stenger. *Metal Treatment*, v. 11, Winter '44-'45, pp. 229-234, 258.

Methods presented have been compiled from various sources and modified for the analysis of magnesium alloys with the aid of a photoelectric colorimeter (filter photometer) or spectrophotometer.

10-18. Determining Traces of Bismuth in Copper by Means of Dithizone. Yu-Lin Yao. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Feb. '45, pp. 114-115.

Method proposed for the determination of traces of bismuth in copper. No new principles are involved. Bismuth is first collected by hydrated manganese dioxide. Bismuth and lead are then extracted in an alkaline medium of cyanide by solution of dithizone in carbon tetrachloride. Finally bismuth is titrated by the solution of dithizone at pH 3. Since this method requires no special apparatus and takes only 2 to 3 hr. to run a single analysis, it is suitable for a control method in a copper refinery. 11 ref.

10-19. Polarography. G. W. Birdsall. *Steel*, v. 116, March 5, '45, pp. 122-123, 162, 164, 167-168, 170, 172.

Method of analyzing complex metal alloys is extremely fast, sensitive and carried out with simple equipment by easily learned and calibrated procedure. Extreme sensitivity detects as little as 0.0001% of an element with an accuracy of 1% of amount present. Tin plate industry and electroplating seen as most important immediate fields of application.

10-20. The Rapid Evaluation of Aluminum Alloys by Spectrochemical Analysis. Kenneth C. Peer. *Light Metal Age*, v. 3, Feb. '45, pp. 12-13, 23.

Rapid and reasonably accurate method of evaluating light alloy compositions.

10-21. Determination of Thickness and Composition of Tin-Lead Alloy Coatings on Steel (Terne Plate). J. W. Price. *The Analyst*, v. 70, Jan. '45, pp. 10-14.

Thickness of tin-lead alloy coatings on steel can be determined by weight loss on treatment with cold hydrochloric acid containing antimony trichloride. The amount of tin-iron alloy layer present in terne plate is generally so small that no correction is necessary for the iron dissolved by the stripping solution. The composition of the coatings can be found by determination of tin in the solution, after stripping, by titration with iodate under standardized conditions, using an empirical factor. Commercial terne plate coatings vary in thickness by as much as 100% over single sheets; coating compositions also vary, independently of thickness. 8 ref.

10-22. Nitrogen in Steel. *Iron and Steel*, v. 18, Feb. '45, p. 60.

Apparatus for estimation by the Kempf-Abresch method.

11. LABORATORY APPARATUS, INSTRUMENTS

11-14. Elements in the Design of Photoelectric Colorimeters. D. H. Matheson. *Chemist Analyst*, v. 34, Feb. '45, pp. 16-18, 20-24.

Review of most of the photoelectric circuits using the photo-voltaic type of cells which are applicable for use in colorimeters. The output of the photo-voltaic cells is not suitable for vacuum tube amplification and any advantage gained thereby is more than offset by the additional complications involved. 17 ref.

11-15. Electronic Applications Find Wide Use in Metal-Working. R. M. Serota. *American Machinist*, v. 89, March 1, '45, pp. 102-104.

While relatively new, industrial electronics has already filled practical shop needs. The field of use seems to be limited only by the ingenuity of the engineer. Cites advantages of high frequency induction heating.

11-16. Metals by Electronics. Vin Zeluff. *Scientific American*, v. 172, April '45, pp. 210-212.

In mines and mills, electronics speeds production, increases safety, improves quality. Some of the applications described point the way toward even greater diversification of the uses of electronics.

12. INSPECTION AND STANDARDIZATION

12-38. The Sigma Signal Indicator. *Machinery* (London) v. 66, Jan. 11, '45, pp. 45-48.

An electric visual gage comprising a unit or measuring head carrying three signal lights, a measuring spindle and two micrometer adjusting screws, designed primarily to facilitate the rapid inspection of components where it was only necessary to establish either plus or minus rejects and not necessary to measure the amount of error.

12-39. Microradiography: A Pictorial Abstract. Leslie W. Ball. *Light Metal Age*, v. 3, Feb. '45, pp. 18-20.

Based upon a slide-illustrated talk given by Leslie W. Ball before the American Foundrymen's Association.

12-40. The Application of Radiography to the Improvement of Foundry Technique. R. Jackson. Iron & Steel Institute Advance Copy, Jan. '45, 35 pp.

Principles involved in the taking and interpretation of a radiograph of a casting are given and the nature and extent of the defects which are revealed discussed. Examples given of the application of radiography to the examination of steel castings and of the methods adopted to improve the quality of castings. Tests carried out on steel castings improved by these means have shown their strength to be much greater than had been previously recognized. 6 ref.

12-41. Adequate Contrast to Delineate the Common Defects in X-Raying Magnesium Parts. Robert Taylor. *American Foundryman*, v. 7, March '45, pp. 17-19.

Visual inspection methods take on new importance in the production of sound castings. Most suitable densities for several thicknesses of metal. (Reprinted May 15, 1944, issue of *Aero Digest.)*

12-42. Electronics in Railroading. John Markus. *Scientific American*, v. 172, March '45, pp. 156-158.

Increased safety is the goal of many uses, direct and indirect, of electronics by the railways. Flaw detection in rails, materials testing, signal systems, and communications all involve the busy electron.

12-43. Testing the Thickness of Non-Ferrous Castings. B. M. Thornton. *Engineering*, v. 159, Feb. 2, '45, pp. 81-83.

Specification for making instrument.

12-44. Latest Recommended Practice for Checking Commercial Forgings by Magnetic Particle Inspection. *Steel*, v. 116, March 5, '45, pp. 126-128, 174, 176, 178, 180, 182, 184, 187.

Surface preparation; magnetizing equipment; powders; methods of magnetization; determinatin of current required; application of powders; interpretation of results; thermal cracks not visible; forging flow lines recognized; demagnetization.

12-45. Vital Inspections of Aircraft Parts Made by Supersonic Measurement. Wesley S. Erwin. *Steel*, v. 116, March 5, '45, pp. 131, 188, 190, 192.

Inaccessible surfaces no longer prevent absolute measurement of the thickness of metals. High frequency sound waves afford exceptional accuracy.

12-46. Magnetic-Particle Testing Stations Reveal Surface Defects Rapidly. F. W. Rohde. *American Machinist*, v. 89, March 15, '45, pp. 107-110.

Magnaflux units are located close to machining operations to detect invisible flaws in highly stressed engine parts. This prevents needless work on materials that are faulty.

12-47. Standard Classification for High Speed Cutting Tools. Anders Jansson. *Tool Engineer*, v. 14, Feb. '45, pp. 24-25.

As a definite step toward allaying much of the confusion in classifying tool steels, three large consumers—General Motors, Ford, and Chrysler—have jointly standardized on classification symbols for high speed steel tools. The material is to be classified according to its major alloying element, its chemical composition in percentage, and the manufacturer.

12-48. Quality Control. B. P. Dudding and W. J. Jennett. *Metal Industry*, v. 66, March 9, '45, pp. 146-149.

Authors deal with the analysis of variance and of variability of measurement. 4 ref.

12-49. Increased Output by Measuring and Testing During Production. Walter Kaal. *Ferugungstechnik*, no. 6, Sept. '43, pp. 129-134. *Engineers' Digest* (American edition), v. 2, March '45, pp. 120-122.

Testing the quality of raw material and dimensions of finished work-pieces.

12-50. X-ray Inspection With Phosphors and Photoelectric Tubes. H. M. Smith. *General Electric Review*, v. 48, March '45, pp. 13-17.

How phosphors and photoelectric tubes can be used in X-ray detection of variations and their measurement. Application to automatic inspection of parts. X-ray absorption as thickness gage.

12-51. Maintaining Scientific Tolerances by Inspection. William B. Rice. *Mechanical Engineering*, v. 67, March '45, pp. 168-170.

Concepts involved; control-chart inspection; an assembly problem; statistical specifications. 7 ref.

12-52. Quality Control. B. P. Dudding and W. J. Jennett. *Metal Industry*, v. 66, March 2, '45, pp. 130-133.

Use of statistical methods in metallurgical industry. 1 ref.

12-53. The Application of Statistical Methods to the Development and Quality Control of High Tensile Steel. Charles M. Mottley. American Society of Naval Engineers *Journal*, v. 57, Feb. '45, pp. 21-55.

Brief history of the development of the steel; describes the organization of the unit which tackled the problems of quality control. A record is given of the chemical composition, physical properties and weldability of the manganese-titanium types of high tensile steel produced during the war emergency period after vanadium became critically short. The use of the latest developments in computing devices to solve the multiple regression problems, involving the effect of ten chemical elements on the physical properties and weldability described. The relation between yield point and tensile strength, the effect of the normalizing treatment on the physical properties, and the relation between Brinell hardness and the physical properties are discussed.

12-54. Macro-Examination. Donald Taylor. *Automobile Engineer*, v. 35, Feb. '45, pp. 43-50.

Investigation of defects in steel manufacture and usage.

12-55. Supersonic Examination. *Automobile Engineer*, v. 35, Feb. '45, pp. 76-77.

Instrument for measuring thickness by high-frequency sound waves.

12-56. Inspection of Light-Alloy Forgings. *Light Metals*, v. 8, Feb. '45, pp. 79-82.

Duties of inspectors in the stamp shop and associated departments, and the organization of an inspection system.

12-57. Microradiography. S. E. Maddigan. *Scientific American*, v. 172, April '45, pp. 219-221.

A powerful new tool and technique, the microradiographic application of X-rays in metallurgy, not to be confused with the familiar radiography to which it is an auxiliary, is giving aid in the improvement of existing alloys and the development of many new ones.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-7. Temperature of Molten Steel Measured With Immersion Thermocouple. *Iron Age*, v. 155, Feb. 22, '45, p. 65.

A platinum thermocouple pyrometer which measures the temperature of a stainless steel bath before the heat is tapped from an electric arc melting furnace, the reading being recorded by an electronic instrument. The development makes possible improvement in the quality and uniformity of stainless steels.

13-8. Heat-Flux Pattern in Fin Tubes Under Radiation. A. R. Mumford and E. M. Powell. *Combustion*, v. 16, Feb. '45, pp. 41-43.

Curves representing the results of temperature measurements on the semi-circumference of finned furnace tubes in a tangentially fired slagging-bottom furnace under varying conditions of slag accumulations; also a laboratory approach to the study of heat-flux pattern in which electrical measurements were employed.

14. FOUNDRY PRACTICE AND APPLIANCES

14-67. Baked Magnesium Sand Molds Inhibited With Potassium Fluoborate. G. H. Curtis. *Iron Age*, v. 155, Feb. 22, '45, pp. 54-61.

Potassium fluoborate used as a magnesium oxidation inhibitor in molding sands for the first time on a large scale. Properties of the fluoborate, in regard to baking characteristics, shake out and collapsibility of the molds, are more favorable than those obtained with the use of boric acid. The fact that this inhibitor decomposes at relatively high temperatures allows greater latitude in core baking practice. It may be used as a sand addition agent, thus eliminating spraying and drying operations. 3 ref.

14-68. Methods and Problems Indigenous to a General Engineering Iron Foundry. William Montgomery and John Doig. *Foundry Trade Journal*, v. 75, Jan. 11, '45, pp. 25-29, 33.

The jobbing shop as a training ground for molders.

14-69. Casting Cutting Tools From High Speed Steel Scrap. J. Albin. *Iron Age*, v. 155, March 1, '45, pp. 54-57.

In a Ford sponsored project setup to take care of disabled veterans, small high speed steel cutting tools are being cast to shape by the "lost wax" refractory mold process, with a few production refinements added.

14-70. Patternmaking. W. C. Perry. *Foundry Trade Journal*, v. 75, Feb. 1, '45, pp. 85-90.

Modern patterns require the skill of the finest woodworker.

14-71. Effect of Shrinkage and Gas Porosity on the Pressure Tightness and Mechanical Properties of Bronze Sand Castings. *Foundry Trade Journal*, v. 75, Feb. 1, '45, pp. 91-93.

Eliminating wasteful practice of pre-ingotting bronzes made from virgin metals.

14-72. Producing Non-Ferrous Castings. R. MacLuckie. *Canadian Metals & Metallurgical Industries*, v. 8, Feb. '45, pp. 28-31.

Practical considerations in equipment and technique.

14-73. Prospects for Cast Metals. Donald J. Reese. *Canadian Metals & Metallurgical Industries*, v. 8, Feb. '45, pp. 38-40.

Brings together some of the essential points that should form the basis of any educational program with considerable detail on gray iron. (Presented at the War Production and Future Planning Conference of the Engineering Societies on War Production, in New York City, Jan. 30, '45.)

14-74. Research Methods in Cast Iron Metallurgy. J. E. Hurst. *Metal Treatment*, v. 11, Winter '44-'45, pp. 219-228.

Investigation on castings continuously produced under uniform methods, where some of the castings showed porosity while others were perfectly sound.

14-75. Precision Casting by the Lost-Wax Process. Adam Dunlop. *Metal Treatment*, v. 11, Winter '44-'45, pp. 247-258.

Outlines a process by which castings in a wide range of alloys can be produced, of such dimensional accuracy and excellence of "as cast" surface finish that little machining is required even for engineering components requiring a high degree of precision. By this process it is possible to produce small castings in steel, high nickel alloys, bronze and brass, etc., to within ±0.002 per in. This precision casting is a modern development of the old lost-wax process. 7 ref.

14-76. Die Castability of Metals and Alloys. *Light Metal Age*, v. 3, Feb. '45, pp. 14-16, 37.

Integrates and discusses the individual metallurgical characteristics which account for the final behavior of light alloys in the die casting machine.

(Continued on page 10)

A.S.M. Review of Current Metal Literature—*Continued*

14. FOUNDRY PRACTICE (*cont.*)

14-77. **British Foundrymen Investigate Basic Cupola Operation to Reduce Sulphur and Phosphorus.** *American Foundryman*, v. 7, March '45, pp. 6-10.
Examination of results obtained in practice with basic-lined cupolas. (Reprinted from *Foundry Trade Journal.*)

14-78. **Veterans Learn to Make Precision Castings.** *Foundry*, v. 73, March '45, pp. 84-85, 206.
Using methods developed by Ford technicians, operations are carried on in a small pilot plant at Camp Legion—Henry Ford's rehabilitation camp for handicapped veterans of World War II.

14-79. **Weighing Cupola Fuel and Metal Charges.** Donald J. Reese. *Foundry*, v. 73, March '45, pp. 86-87, 190, 192, 194.
Reasons given why cupola charge materials are weighed. Cupola charges smaller; carbon variance; use different scales; scale must be strong.

14-80. **Progress in Malleable Iron Melting in the United States.** A. J. Grindle. *Foundry*, v. 73, March '45, pp. 91, 196, 198.
Melting methods and fuels utilized; grades of malleable iron produced; analysis changes in duplexing.

14-81. **Permanent Mold Castings.** John Vickers. *Foundry*, v. 73, March '45, pp. 100-102, 200, 202, 204.
Molds and procedures in casting with permanent molds.

14-82. **Oxidation Inhibitors in Core-Sand Mixtures for Magnesium Castings.** O. Jay Myers. *Metals Technology*, v. 12, Feb. '45, T.P. 1776, 9 pp.
Basic core of dry-sand mold mixture for magnesium in use today is compounded with sand, core oil or resin binder, cereal, and moisture. Core oil or resin binder are added for baked strength while the cereal binder and moisture are for green strength. Protective agents; experiments with mixtures; physical properties of core-sand mixtures.

14-83. **Symposium on Continuous Casting.** *Metals Technology*, v. 12, Feb. '45, T.P. 1793, 46 pp.
Opening remarks by Carl E. Swartz. Continuous Casting Yesterday and Today, by T. W. Lippert. Continuous Casting of Metals—History. Requirements, Metallury, and Economics, by Norman P. Goss. Improvements in the Direct Casting of Strip Metals; by C. W. Hazelett. The Soro Process, by E. I. Valyi. The Williams Process of Casting Metals, by E. R. Williams.

14-84. **The Principles of the Testing of Mould and Core Sands and Their Development Possibilities With Special Reference to the Fischer Testing Apparatus.** W. Goetz. *Giesserei*, v. 30, June '44, pp. 91-95. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 75-A.
Having regard to the advancement in the knowledge of the properties and characteristics of molding sands, improvements in sand testing apparatus have been introduced. The fundamentals of sand testing are considered and some recent improvements which have been developed by a German firm making test apparatus are described.

14-85. **The Investigation of Dried Moulding Sands.** H. Baresch. *Giesserei*, v. 30, April '44, pp. 55-59. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 75-A.
Methods of testing dried molding sand for steel castings are discussed. From tests it was observed that when a green sand had a maximum permeability with 3% of moisture, dry sand of the same type had a maximum permeability when the initial moisture content was 4%. Curves showing the effect of initial moisture content on the strength and permeability of a number of sands are presented.

14-86. **New Knowledge and Proposals on the Subject of Testing Molding Sand.** W. Reitmeister. *Giesserei*, v. 31, Sept. '44, pp. 136-141. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 75-A.
Factors affecting the apparent density of molding sand mixtures are discussed and data are presented relating this property to the strength and permeability.

14-87. **A New Moulding Process for Grey Iron Castings.** K. Grunke. *Giesserei*, v. 31, Aug. '44, pp. 126-128. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 75-A.
The Godel cement-sand molding process is briefly described. In this, a cement-sand is used as pattern sand, and the remainder of the mold is filled up with silver sand. No hand or pneumatic ramming is necessary. Examples of two large castings, the molds for which were prepared in this way, are described and illustrated.

14-88. **Segregation in Babbitt.** T. E. Eagan and W. R. McCrackin. *Metal Industry*, v. 66, Feb. 23, '45, pp. 118-120.
Deals with the effect of inoculants, static and centrifugal casting methods and outlines the technique for the control of segregation in centrifugally cast bearings.

14-89. **Advantages and Characteristics of Light-Metal Permanent-Mold Castings.** L. F. Swoboda. *Machinery*, v. 51, March '45, pp. 174-176.
Difference between permanent mold casting and die casting; advantages of permanent mold castings; cost considerations in connection with permanent mold castings; the design of permanent mold castings; important points to consider in casting design; uniformity and thickness of metal section. (Presented before a recent meeting of the Society of Automotive Engineers.)

14-90. **Inoculants in Gray Iron.** Rebeca Hall Smith. *Iron Age*, v. 155, March 15, '45, pp. 58-62.
Shows how the use of inoculants aids both large and small foundries in obtaining better castings, either by the control of graphite or as stabilizers and strengtheners. Tests are described which help in the selection of the type of inoculant and the amount to use. 5 ref.

14-91. **The Relationship Between Blast Pressure, Blast Quantity and Cupola Dimensions.** H. Jungbluth. *Archiv fur das Eisenhuttenwesen*, v. 17, July-August, '43, pp. 1-4. British Cast Iron Research Association *Bulletin and Foundry Abstracts*, v. 7, Jan. '45, p. 217.
Experiments are described which enabled curves to be constructed showing the relationship between the pressure and volume of the blast supplied to cupolas. From these and other test results a formula was derived for the blast pressure in terms of the blast volume, cupola cross-sectional area, cupola height and coke lump size. (Abstract reprinted from Iron and Steel Institute *Bulletin*, no. 105, Sept. '44, pp. 121A-122A.)

14-92. **Precision Casting Obviates Machining.** Arnold Ristow. *Machine Design*, v. 17, March '45, p. 150.
Bucket patterns are molded in groups of four, with individual riser and a common branch riser molded integral. Molding is done in bismuth-lead die sets made from a steel "master" machined to the exact shape of the bucket plus shrinkage allowance. Wax at a temperature of 140° F. is injected into the mold under a pressure of 65 to 85 psi.

14-93. **Stronger Die Castings Are Obtained by Proper Die Design.** *Steel*, v. 116, March 26, '45, pp. 94-95, 128, 130.
Method of establishing values of impact strength, tensile strength, elongation and other mechanical properties of zinc alloys for die casting is to use data obtained from die cast test bars made under controlled conditions representative of what is considered best practice. Investigation showed that the design of the die has an appreciable effect on the properties of the casting made in it.

14-94. **Founding of Magnesium Alloys.** *Light Metals*, v. 8, Jan. '45, pp. 3-6.
Fluxes, fluxing technique, and superheating.

14-95. **Precision Castings by the Lost Wax Process.** Adam Dumlop. *Foundry Trade Journal*, v. 75, Feb. 8, '45, pp. 107-116, 118.
Modern development of an old process. 7 ref.

14-96. **The Hows and Whys of Centrifugal Casting.** Harold B. Zuehlke. *Aluminum and the Non-Ferrous Review*, v. 9, July-Sept. '44, pp. 44, 46-48.
Description of process; speed of rotation; angle of shafts and pouring spouts.

14-97. **Founding of Magnesium Alloys.** *Light Metals*, v. 8, Feb. '45, pp. 82-84.
Properties of molding sands suitable for the magnesium foundry together with the nature and purpose of inhibitors.

14-98. **Work on the Spindle.** J. H. List. *Iron and Steel*, v. 18, Feb. '45, pp. 51-52.
Balanced flywheel molded in green sand.

15. SALVAGE AND SECONDARY METALS

15-6. **Scrap Melting Procedure Saves Alloys.** Victor E. Zang. *Foundry*, v. 73, March '45, pp. 92-93, 198.
Unitcast Corp. reviews alloy program for the year of 1944 as a supplement to the October report of the Ferrous Foundry Advisory Committee to the War Production Board.

15-7. **Iron and Steel Scrap.** Harold E. Carmony. *Mining Congress Journal*, v. 31, Feb. '45, pp. 118-119.
Iron and steel scrap industry continues laudable performance.

15-8. **Nonferrous Scrap and Secondary Metals.** F. H. Wright. *Mining Congress Journal*, v. 31, Feb. '45, pp. 120-122.
The level of activity in the non-ferrous secondary metals industry in 1944 was maintained close to the high rate achieved in 1943, with immense quantities of new scrap originating in industrial plants moving swiftly back into the stream of usable raw materials.

15-9. **Cyanide Removal From Metal Finishing Wastes.** Francis S. Friel and Gordon J. Wiest. *Water Works and Sewerage*, v. 92, March '45, pp. 97-98.
Method of treatment involving chlorination for destruction of the cyanides. 7 ref.

15-10. **Reclaiming Cracked Castings—an Electrolytic Process.** *Production & Engineering Bulletin*, v. 3, no. 23, Oct. '44, pp. 454-455. British Cast Iron Reserch Association *Bulletin and Foundry Abstracts*, v. 7, Jan. '45, p. 217.
Describes the repair of cracked castings by electrodeposition of copper.

16. FURNACES AND FUELS

16-27. **Rotating Hearth Furnaces.** A. C. Kramer. *Industrial Heating*, v. 12, Feb. '45, pp. 248, 250, 252.
Due to the wide operating temperature range, the ease of operation, labor saving, temperature uniformity and the ability to heat a wide variation in size of materials, this installation has won favor over other conventionally designed furnaces.

16-28. **Unique Firing Method Features Operation of Cover-Type Furnaces.** Oscar Olson. *Industrial Heating*, v. 12, Feb. '45, pp. 254, 256, 258, 260, 266.
Burners of unique design are a feature of a type of cover furnace which has been successfully applied in the recent past to the heat treatment of steel in wire, rod, strip, coil and sheet form, in such operations as normalizing, annealing and spheroidizing.

16-29. **Furnace Operation and Control.** Roy S. Arrandale. *Glass Industry*, v. 26, March '45, pp. 128-130, 147.
Furnace operation. Producer gas-fired; oil-fired; natural gas; effect of composition.

16-30. **U. S., European, Continuous Enameling Furnaces Compared.** Paul A. Huppert. *Ceramic Industry*, v. 44, March '45, pp. 55-56, 58.
Specific information about the recuperative system in European construction. 19 ref.

16-31. **The Electric Rocking Resistor Furnace.** C. S. Johnson. *Foundry Trade Journal*, v. 75, Jan. 11, '45, pp. 31-33.
Attractive features of this type of equipment.

16-32. **Arc Furnace Regulators.** R. A. Geiselman and J. E. Reilly. *Steel*, v. 116, March 19, '45, pp. 136, 139, 170, 172.
Control of generator voltage affords variation through full speed range of motor operating the electrode hoist with a marked reduction in the breakage of electrodes. Electronic regulation and control of electrode motors provide sensitivity and speed of response.

16-33. **Symposium on Measurement of Heat Absorption in Furnaces.** *Industrial Heating*, v. 12, March '45, pp. 402, 404, 406, 408.
Temperature measurement of a steel slab under normal steel plant operation; test results.

16-34. **Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces.** Wallace G. Imhoff. *Industrial Gas*, v. 23, March '45, pp. 20-21, 32, 34.
Galvanizing furnaces—gas-fired—Eclipse Fuel Engineering Co. furnaces.

17. REFRACTORIES AND FURNACE MATERIALS

17-15. **Reaction Between Copper Reverberatory Slag and Refractories.** Sahap S. Kocatopcu. American Ceramic Society *Journal*, v. 28, March 1, '45, pp. 65-71.
Small slag cylinders placed on top of different refractory brick were heated at 1300 and 1400°C. Depth and width of reaction and diffusion zones were measured, and thin sections through the penetrations were studied.

17-16. **A New Development in Insulation.** H. D. Minich. *Wire & Wire Products*, v. 20, March '45, pp. 203-204.
Review of the work of Tensolite Corp. so that electronics engineers and executives might become better acquainted with this unique process.

17-17. **The Manufacture of Refractory Insulating Products, II.** J. F. Clements, L. R. Barrett and A. T. Green. *Brick & Clay Record*, v. 106, March '45, pp. 55-56, 58.
Late developments in formation of pores by mechanical frothing and by chemical bloating are discussed. Other methods classified.

17-18. **Economic Thickness of Thermal Insulation for Intermittent Operations: III.** C. B. Bradley, C. E. Ernst and V. Paschkis. *Industrial Heating*, v. 12, Feb. '45, pp. 290, 292, 294, 296.

Considers the most economic thickness as that yielding the smallest sum of cost of heat loss and fixed cost of installation. A method for determining this economic thickness is described which is based upon the electrical analogy method, and its applications and limitations discussed. (Presented at the Semi-Annual meeting, American Society of Mechanical Engineers, Pittsburgh, June '44.) 11 ref.

17-19. **The Behaviour of Refractory Materials Under Stress at High Temperatures.** F. H. Clews, H. M. Richardson, and A. T. Green. British Ceramic Society *Transactions*, v. 43, Nov. '44, pp. 223-240.

Deformation of porcelain has been studied at temperatures from 900° to 1100° C. using tensile and torsion-stress. Over extended periods stress and time-hardening occurs. Different types of deformation discussed with reference to typical time-deformation curves.

18. HEAT TREATMENT

18-53. **Induction Heating of Internal Surfaces in the Automotive Industry.** Howard E. Somes. *Steel Processing*, v. 31, Feb. '45, pp. 90-96, 130.

Covers one specific field of induction heat treating, i.e., the treatment of internal diameters. Here, a zone of relatively shallow depth, commencing at the bore of a hollow body and extending outward radially, is to be heated so rapidly as to be confined to but a portion of the work piece and then at the required time quenched. Hardness; case thickness; stresses; D/T ratio; the machine; new applications; cylinder sleeves; dry cylinder liners; hubs; integral bearing cages; bearing race application; axle ends; internal gears; internal splines; grease retainer recesses; hydraulic cylinders.

18-54. **High-Frequency Heating of Conductors and Non-Conductors.** R. M. Baker and C. J. Madsen. *Electrical Engineering*, v. 64, Feb. '45, pp. 50-57.

Theories of induction heating of metallic electric conductors and of dielectric heating of non-metallic non-conductors are discussed in simple terms for the benefit of those who are not specialists in this field. The various types of high frequency heating, its applications to industry, and its advantages in economy, efficiency, speed, and adaptability are pointed out. 14 ref.

18-55. **Fundamental Principles and Applications of Induction Heating, V.** *Sheet Metal Industries*, v. 21, Feb. '45, pp. 293-297, 310.

Continuous hardening of bars; megacycle hardening. 10 ref.

18-56. **Sub-Zero Treatment of Steel.** H. C. A. *Machinery* (London), v. 66, Jan. 11, '45, pp. 29-34.

Presentation of the fundamentals of cooling hardened steels to temperatures considerably below room temperature, properly correlated with the basic treatment cycle and related structural changes. 11 ref.

18-57. **This Heat-Treatment Business.** A. J. K. Honeyman. *Metal Treatment*, v. 11, Winter '44-'45, pp. 207-212.

Devices which are widely discussed and less widely employed in order to improve the properties of heat-treated steels. Boron additions; timed quenching, martempering, austempering and subzero cooling.

18-58. **Induction Heating Cycles.** W. E. Benninghoff and H. B. Osborn. *Canadian Metals & Metallurgical Industries*, v. 8, Feb. '45, pp. 32-37, 40.

Selection of frequency and time for processing of metallic parts. 5 ref.

18-59. **AC Spark Plug Construction of Machine Guns Involves Numerous Heat Treatments.** *Industrial Heating*, v. 12, Feb. '45, pp. 207-208, 210, 212, 214, 216, 218, 220.

Discusses some of the methods used in processing specific parts of the .50 caliber Browning machine gun, as well as the equipment used in production hardening, carburizing, and similar operations.

18-60. **The Tempering of Steel.** *Industrial Heating*, v. 12, Feb. '45, pp. 242, 244, 246.

Structural changes during the tempering of high carbon steel, the effect of carbon on the tempering of steel; the tempering of nickel and nickel-molybdenum steels, and the effect of quenching bath temperature on the tempering of high speed steel.

18-61. **Queen City Steel Treating Company Plant Features Modernized Production Set-Up: II.** *Industrial Heating*, v. 12, Feb. '45, pp. 310, 312, 314, 316.

Cleaning equipment, brazing facilities and straightening, testing and inspection equipment described, along with the furnaces and related units in Plant No. 2, which is engaged primarily in nitriding operations along with some heat treatment of non-ferrous alloys.

18-62. **Alloy Steels.** *Iron & Steel*, v. 18, Jan. '45, pp. 33-35.

Producer gas-fired installation for heat treating bars and sections.

18-63. **Fundamental Principles and Applications of Induction Heating.** "Heat Treater." *Sheet Metal Industries*, v. 21, Jan. '45, pp. 111-115.

Part V—Induction hardening. Heat treatment of gears; accurate specification of steel necessary; applications in the motor-car industry.

18-64. **A Producer-Gas Fired Heat Treatment Furnace Installation for Alloy and Special Steel Bars.** *Sheet Metal Industries*, v. 21, Jan. '45, pp. 126-128.

Quenching; electrically operated charging machine; electrical controls.

18-65. **Tooling for Induction Heating.** Frank W. Curtis. *Tool Engineer*, v. 14, Feb. '45, pp. 18-24.

This ultra modern technique, though still in its infancy, effects marked economies in mass production and promises to revolutionize the manufacture of complex parts.

18-66. **Continuous Heat Treatment.** Harry W. Smith. *Iron Age*, v. 155, March 8, '45, pp. 58-63.

The development of all-ceramic burners handling high-pressure carbureted gas-air-mixtures has opened new vistas in heat treatment. High speed, automatic continuous units, clean and very compact, are being developed for bar and strip stock in both ferrous and non-ferrous industries.

18-67. **Electronic Heating of Metals and Non-Metallic Materials.** Holbrook L. Horton. *Machinery*, v. 51, March '45, pp. 147-155.

Considers briefly ways in which induction and dielectric heating are produced; ways in which electronic devices can be applied in the mechanical field.

18-68. **Megacycle Induction Heating.** Vernon W. Sherman. *Steel*, v. 116, March 12, '45, pp. 116, 158, 160, 162, 164, 167.

Frequencies of 2,000,000 to 5,000,000 cycles per second are used in rapidly producing hardened cases ranging from 0.003 to 0.030 in. in depth without altering the heat treating benefits of previously toughened core. Process may be used to heat treat sorbitic steels to duplicate results of sub-zero treatments, says author in report also presented before the Electro-chemical Society.

18-69. **Heat Treating Armor Plate at Ford Rouge Plant.** *Industrial Heating*, v. 12, March '45, pp. 383-386, 388, 390, 392, 394-396, 398, 400.

Five production lines installed, one of which is described.

18-70. **Heat Treatment of Broaches Requires Specialized Equipment and Technique.** *Industrial Heating*, v. 12, March '45, pp. 410, 412, 414, 416, 418.

Heat treating department; vertical furnaces; horizontal heat treating furnaces; salt bath equipment; accessories and auxiliary equipment; heat treating procedures; laboratory facilities.

18-71. **Sub-Atmospheric Treatment and Sodium Cyaniding of Tool Steels.** *Industrial Heating*, v. 12, March '45, pp. 420, 422, 426.

Sub-atmospheric transformation of retained austenite; sub-zero treatment of Mo-W high speed steel.

18-72. **Perfection Plant in Chicago Features Special Processes for Treating Tools.** *Industrial Heating*, v. 12, March '45, pp. 489-492, 494, 496, 498-500.

Description of plant and equipment.

18-73. **Cold Treatment in Gage Stabilization.** Charles T. Post. *Iron Age*, v. 155, March 15, '44, pp. 52-54.

Six cooling cycles at —120° F., each followed by tempering, complete austenite-martensite transformation to stabilize gage blocks. This treatment, along with the new Bureau of Standards test, has greatly accelerated production.

18-74. **Simultaneous Hardening and Tempering.** Stephen Smith. *Machine Design*, v. 17, March '45, pp. 157-158.

Established metallurgical principles of heat treating practice, such as heating the surface above the critical temperature, quenching with a suitable medium, and tempering or reheating to the proper temperature to produce the desired degree of surface hardness, are incorporated in a new process of simultaneous flame hardening and tempering. The technique really combines heating, quenching and tempering into a single, progressive operation.

18-75. **Application of Controlled Atmospheres to the Processing of Metals, II.** C. E. Peck. *Western Metals*, v. 3, Feb. '45, pp. 10-12, 15-16.

Auxiliary equipment for drying atmosphere gases; furnace equipment to be used with controlled atmosphere; annealing (non-ferrous metals); hardening of ferrous metals; gas carburizing; atmosphere furnace brazing non-ferrous metals; ferrous metal brazing; sintering or powder metallurgy applications.

18-76. **Gases for Heat Treating Purposes.** *Machinery*, v. 51, March '45, pp. 162-163.

Gases referred to are known by various trade names and are used for different purposes, according to whether the mixtures are lean or rich. Applications of each are briefly referred to.

18-77. **Induction Heating.** Frank T. Chesnut. *Iron Age*, v. 155, March 22, '45, pp. 46-53.

Growth of applications by the pioneer company in the field is traced and future possibilities pointed out.

18-78. **Fundamental Principles and Applications of Induction Heating.** *Sheet Metal Industries*, v. 21, March '45, pp. 489-493.

Internal hardening and assembly processes.

18-79. **Normalizing Versus Stress-Relieving.** O. Schmidt and E. Jollenbeck. *Welding Journal*, v. 24, March '45, pp. 185s-192s.

Metallurgical considerations; mechanical characteristics.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-52. **Carbon Steel for the Wire Industry.** A. M. Reeder. *Wire & Wire Products*, v. 20, Jan. '45, pp. 25, 27-33.

Improvements in iron quality; bessemer steel and open hearth steel manufacture; ingot practices; austenitic grain size control; proper ingot mold practice; heating and rolling.

19-53. **Carbide Die Applications.** A. R. Zapp. *Wire & Wire Products*, v. 20, Jan. '45, pp. 35, 38-41, 83.

Development and application of tungsten carbide dies for nail mills and for cold heading operations.

19-54. **Automotive Crankshafts Forged on Mechanical Presses.** *Iron Age*, v. 155, Feb. 22, '45, pp. 62-64.

Experimental runs indicate that production is considerably higher than on the steam hammer due to the fewer number of blows required to produce a forging of satisfactory finish, while the greater simplicity of operation demands less effort and skill.

19-55. **Aluminum Fins Rolled on Aircraft Engine Cylinders.** *Iron Age*, v. 155, Feb. 22, '45, pp. 66-70.

An annual saving of 12,000 tons of nitralloy steel is being achieved by the substitution of aluminum strip rolled on edge and caulked in grooves in the steel barrel of aircraft engine cylinders. Use of deeper fins and 30% more of these results in much more effective cooling of the barrel. How new type of "W" fin is applied to Wright Cyclone aircraft engine cylinders described.

19-56. **Tinplate and Sheet Manufacturers' Section.** L. R. Underwood. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 245-254.

First chapters of a new work on rolling mill theory and practice. 34 ref.

19-57. **Reactive Wire Drawing.** Kenneth B. Lewis. *Wire Industry*, v. 12, Feb. '45, pp. 79, 81.

Cone forces; the friction factor; could wire be stressed; Stringfellow's device; advantages of system.

A.S.M. Review of Current Metal Literature — *Continued*

19. WORKING (*Cont.*)

19-58. Rolling Precision Threads. *Wire Industry*, v. 12, Feb. '45, pp. 87-90.

Greater speed in the production of precision threaded parts, with increased strength, improved surface finish and a more uniform product, are advantages claimed for the thread rolling process.

19-59. Phosphate Coatings as Applied to Wire Drawing. V. D. Smith. *Wire & Wire Products*, v. 20, Feb. '45, pp. 121-123.

Experiments with phosphate coatings show that such coatings give longer die life, impart rust resistance to wire and other advantages in wire drawing at very slight increase in production cost.

19-60. Forging Die Design. John Mueller. *Steel Processing*, v. 31, Feb. '45, pp. 97-99.

Records the variations of length possible under normal forging operations, which although well understood in principle have possibly been slighted in the appreciation of the wide divergence of lengths caused by thermal and forging malpractice to account for a good deal of trouble sometimes experienced with respect to length variations.

19-61. Forming and Drawing Steel in Kirksite "A" Dies. C. W. Hinman. *Steel Processing*, v. 31, Feb. '45, pp. 107-108.

Kirksite "A" has a very low melting point, 717° F. and its compressive strength is up to 75,000 psi. It has replaced many other materials formerly used in building certain stamping dies, and even those used in forming parts from steel. Many thousands of tons of this metal have been cast into punch and die parts.

19-62. The Manufacture of Large Marine Engine Forgings. Robert Liston. *Steel Processing*, v. 31, Feb. '45, pp. 109-110, 117-119, 126, 128.

Deals only with one stage of manufacture and that is the shaping or forging of the required component from the ingot under a hydraulic forging press.

19-63. Forging. *British Steelmaker*, v. 11, Feb. '45, pp. 68-73.

Forging round bars; mechanical properties.

19-64. Stretch Press Forming of Aluminum. Gilbert C. Close. *Light Metal Age*, v. 3, Feb. '45, pp. 8-11.

The fabrication of light metal sheet has been greatly advanced by employment of the stretch press, an ingenious tool which keeps both sides of the sheet under tension during bending and forming operations. Operation and methods employed with this machine are described.

19-65. Practical Forging of Steel. M. B. Halpenny. *Canadian Metals & Metallurgical Industries*, v. 8, Feb. '45, pp. 20-25, 45.

Hammer and press work on constructional steels.

19-66. Further Comments on Scotland's Wire Practices. A. P. Newhall. *Wire & Wire Products*, v. 20, March '45, pp. 193-195.

Notes published in April 1944 issue, headed "Wire Drawing in Scotland," gave rise to further comments, which will clarify the situation with respect to the mills, which are typical of Scotland.

19-67. Relative Workability of Metals. A. G. H. Anderson. *Wire & Wire Products*, v. 20, March '45, p. 202.

Notes on the problem of stresses involved in the deformation of metal by wire drawing.

19-68. Formed Sheet Metal Parts Classified by Shape, I. Mark P. Meinel. *Product Engineering*, v. 16, March '45, pp. 167-171.

Formed sheet metal parts, particularly of aluminum alloys, are classified by finished shapes in relation to the factors in design that should be considered for simplest production methods and to the many various production methods and machines that are in use. Singly curved parts and curved sections described in this article.

19-69. Forging Propeller Hubs. L. E. Browne. *Steel*, v. 116, March 19, '45, pp. 111, 148.

One-piece, four-arm hub, forged with the minimum finish inside and out has reduced metal loss in machining, with material savings of as much as 25 to 30% for forging.

19-70. Diamond Dies. *Steel*, v. 116, March 19, '45, pp. 122, 124, 127, 166.

Results of work at National Bureau of Standards sponsored by the War Production Board in developing improved methods for producing dies for superfine wire, an essential requirement for radio and radar equipment.

19-71. Practical Problems of Light Presswork Production. J. A. Grainger. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 263-272.

Single impression combination tools; double and triple combination tools and combination follow-on tools.

19-72. Semi-Finished Steel. Ross E. Beynon. *Iron & Steel*, v. 18, Jan. '45, pp. 18-22.

Rolling methods and problems.

19-73. Progress in Hot Cropping Operations. A. G. Arend. *Drop Forger*, v. 24, Nov. '44, pp. 106-108. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 77-A.

The application of hot saws and the layout of forging machines in relation to the hot saw which cuts off the billets or blanks to the required size are discussed.

19-74. Krause Reciprocating Mill as Used for Brass Rolling. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 65-67.

This unique rolling mill, with a reciprocating roll assembly, is being successfully employed for heavy reductions on wide brass strip. Indications are that it also may find application in the reduction of steel strip requiring particular physical characteristics.

19-75. The Metadyne Electrical Control System Applied to Speed Control on Rolling Mills. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 72-74.

Tandem and reversing strip mill control. Tension regulation on winding and unwinding reels.

19-76. Practical Problems of Light Presswork Production. J. A. Grainger. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 81-84, 88.

For bending and forming work a press of robust design, well supported to withstand the stresses set up in the frame, and with substantial guides to the slide, should be chosen.

19-77. Education and Training in the Sheet Metal Industry. A. P. M. Fleming. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 101-107, 110.

Importance of craftsmanship; education for craftsmanship; particular training for craftsmanship; adult education; the trade apprentice course at Metropolitan-Vickers Electrical Co., Ltd.

19-78. Metal Spinning—Practice and Procedure. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 116-118, 123-125, 128

Spinning process has decided advantages owing to the low cost of the chucks employed compared with that of press tools. Process often used in conjunction with the press, initial forming being carried out by pressing, and the more complex shaping that follows by spinning. Owing to the ease with which it can be worked, its ductility and its freedom from excessive and harmful work hardening and season cracking, aluminum is probably the most commonly spun metal.

19-79. Indian Aluminum. *Chemical Age*, v. 52, Feb. 3, '45, p. 125.

Rolling mills and reduction works completed.

19-80. Change Gears Applied to Die Control Length of Slotted Parts. G. Letche. *American Machinist*, v. 89, March 1, '45, pp. 117-118.

Compact attachment applied to the front of the die shoe is operated by a ratchet each time the punch descends, controls the cut-off.

19-81. Tension and Power Consumption in Cold Rolling. M. Fainberg. *Stal*, v. 1943, nos. ¾, April '43, pp. 27-29. *Engineers' Digest* (American Edition), v. 2, March '45, pp. 138-139.

Relates to a method which, by means of ordinary technical ammeters, permits the determination of the tension of the strip, even in cases where two-sided tension is employed in continuous tandem mills. It also makes possible the establishment of the load and power consumption of the individual drives.

19-82. Pilger Mill Drive Without Flywheel. M. Fainberg. *Stal*, v. 1943, no. 9/10, Oct. '43, pp. 36-41. *Engineers' Digest* (American Edition), v. 2, March '45, pp. 142-144.

Mathematical development.

19-83. Dies Made From Cerrobend for Limited Production. Kenneth C. Cathcart. *Machinery*, v. 51, March '45, pp. 139-146.

Alloy possesses physical properties that make it a suitable material from which to produce hand-forming hydraulic press and drawing dies, backing blocks, punches and pressure plates, power-brake joggle dies, and numerous other tools. Generally, these tools can be made from Cerrobend in less time than it would take to make the patterns for standard tools.

19-84. Forging Automobile Crankshafts on High-Speed Mechanical Presses. *Machinery*, v. 51, March '45, pp. 164-165.

Object was not so much to improve the physical quality of the forging as to produce equally good physical properties, with close dimensional accuracy, at a substantial reduction in forging cost.

19-85. Extrusion of Copper-base and Auminum Alloys. *Iron Age*, v. 155, March 8, '45, pp. 76-79.

Summaries of symposium scheduled for annual convention of Institute of Metals Div. and of Iron & Steel Div. of A.I.M.E. Extruding plain and tubular sections of copper-base alloys. Factors affecting the rate of extrusion of aluminum alloys.

19-86. Electric Arc Hot Tops Reduce Ingot Losses in Producing High Nickel Alloys. John D. Knox. *Steel*, v. 116, March 12, '45, pp. 106-107, 126, 128.

Lime glass maintained in molten state on top of ingot for about 12 min. minimizes croppage. First mills of cluster type built in this country to roll wide sheets are still in service. Extrusion press of 4000 tons capacity makes possible the extrusion of high nickel alloys. Manufacture of Monel metal described in detail.

19-87. The Universal Slabbing Mill at Homestead. A. G. Ericson. *Iron and Steel Engineer*, v. 22, March '45, pp. 35-46.

Innovations in rolling mill which are well worth considering.

19-88. Spinning Aluminum. E. H. Benson. *Aluminum & Magnesium*, v. 1, Feb. '45, pp. 28-29, 36-37.

Aluminum is easier to spin than other non-ferrous metals and requires less mechanical skill to avoid scratching with the risk of fracture on a deep spinning. It requires less annealing or forming operations and is one of the most workable of commercial metals.

19-89. Modern Forge Shop. Frank M. Scotten. *Production Engineering & Management*, v. 15, March '45, pp. 89-92.

Use of forging presses, induction heating units, and continuous conveyor-type furnaces indicates extent of modernization in Oldsmobile division.

19-90. Mill Built for Russia; Can Roll Billets, Strip, Rounds or Squares. *Blast Furnace and Steel Plant*, v. 33, March '45, pp. 350-354.

Flow diagrams indicate the movement of material when different types of products are being rolled.

19-91. The Modern Ingot Buggy With Amplidyne Control. R. E. Marrs. *Blast Furnace and Steel Plant*, v. 33, March '45, pp. 355-359.

Vehicle for the conveyance of uniformly hot ingots from soaking pit furnaces to the entry table of a rolling mill. Function of this buggy in the maintenance of production schedules on a modern rolling mill is a most important one and the selection of its drive and control deserves careful study.

19-92. The Rolling of Metals; Theory and Experiment. L. R. Underwood. *Sheet Metal Industries*, v. 21, March '45, pp. 429-436.

Forward slip. 17 ref.

19-93. Practical Problems of Light Presswork Production. J. A. Grainger. *Sheet Metal Industries*, v. 21, March '45, pp. 449-452.

Design for a double impression combination washer tool shown, for producing washers from copper strip 0.085 in. in thickness. Owing to the weight of the coil and the thickness of the material, a very robust and rigid stock reel is necessary at both the feed end and the scrap delivery end of the press.

19-94. Electric Drives for Power Presses. *Sheet Metal Industries*, v. 21, March '45, pp. 453-455.

Combined effect of the necessity for high-speed working and the widespread introduction of female labor has thrown into relief the supreme advantages of electrical operation.

19-95. Drawing Tungsten and Molybdenum Wire. Irwin H. Such. *Steel*, v. 116, March 26, '45, pp. 90-91, 110.

Chemical compounds are converted into wire as small as 0.00055 in. in diameter in process requiring drying furnaces, hydraulic presses, sintering furnaces, swaging machines, draw benches and miniature drawing and annealing equipment.

19-96. Photographic Layouts. A. R. Eckberg and H. C. Staehle. *Steel*, v. 116, March 26, '45, pp. 92-93, 122, 124, 126.

New process developed for sheet-metal industry, to replace templates.

19-97. Drawing It Out Fine. Robert L. Zhour, *Scientific American*, v. 172, April '45, pp. 232, 234.

Wire drawing today is a complex series of precise operations which depend upon accurate dies and the careful regulation of lubricants and drawing speeds. The drawing of fine wires necessary in many electronic devices is expected in itself to grow into a major industry.

19-98. Rolling and Drawing Brass. *Aluminum and the Non-Ferrous Review*, v. 9, July-Sept. '44, pp. 39-40.

Successful rolling and drawing of brass for the production of different engineering sections is largely influenced by the type of oil which is selected. It is not merely the friction which might tend to increase at the roll neck, but the direct reduction in output, and adverse appearance of the metal surface when an inferior oil is employed.

19-99. Marine Engines. Robert Liston. *Iron and Steel*, v. 18, Feb. '45, pp. 69-72.

In this paper, taken from the *Journal* of the West of Scotland Iron and Steel Institute, the shaping or forging of the required component from the ingot under a hydraulic forging press is dealt with.

20. MACHINING AND MACHINE TOOLS

20-65. Automatic Milling of Side Teeth on Side and Face Cutters. W. Zikel. *Machinery* (London), v. 66, Jan. 11, '45, pp. 37-40.

Automatic electro-pneumatic milling fixture increasing output and quality. One operator can attend to several such fixtures at the same time. The electrical arrangement; the design; two fixtures used.

20-66. Drum-Type Fixture Speeds-up Drilling. C. R. P. *Machinery* (London), v. 66, Jan. 11, '45, p. 35.

Twenty pieces per minute, as compared with four by the old method, are produced on a drum-type fixture devised for drilling large quantities of small aluminum supports at the U. S. General Electric Co.'s Schenectady Works.

20-67. Methods Used in Producing Engines for the Super-Fortresses. K. E. S. *Machinery* (London), v. 66, Jan. 11, '45, pp. 41-44.

New plant built specifically for producing these powerful engines and for machining the crank cases of Cyclone-9 engines.

20-68. Band Sawing Stainless Steel Shells. Jack L. McGraw and Aaron H. Shum. *Modern Industrial Press*, v. 7, Feb. '45, pp. 27-28.

The problem of speedily and accurately trimming a tough, triple-drawn, double-walled, 16-gage stainless steel ball joint and its interlocking socket and clamp was superbly solved by a revolutionary motorized saw fixture designed and built at Lockheed Aircraft Corp.'s Plant A-2 for a Yates-American 30-in. wheel band saw.

20-69. The Use of Carbides for Press Work. *Tool & Die Journal*, v. 10, Feb. '45, pp. 97-100, 140.

To illustrate design and application practice followed by industry in adapting carbides to press work, a number of commercial applications have been selected. The performance in each individual case has been investigated and the information is presented.

20-70. Application of Compressed Air Speeds National Acme Production and Cuts Costs. *Tool & Die Journal*, v. 10, Feb. '45, pp. 104-106, 140.

Liberal application to everyday jobs.

20-71. Machining "Bristol" Hercules Connecting Rods. *Machinery* (London), v. 66, Feb. 1, '45, pp. 109-114.

Rods machined from drop forgings of air-hardening nickel-chromium steel, the tensile strength of which, after hardening, is not less than 100 tons per sq. in. Operations commence with broaching the end bosses of the forging to rough width, to provide datum faces.

20-72. Cam-Profiling Fixture. J. M. *Machinery* (London) v. 66, Feb. 1, '45, pp. 123-124.

Purpose of this fixture is for milling the profile of face cams, using a standard universal milling machine.

20-73. Special Twisting Fixture Straightens B-29 Spar Chords. Harry L. Giwosky. *American Machinist*, v. 89, March 15, '45, pp. 116-118.

Boeing engineers developed the special device for attachment to a standard press. Different blocks are used in straightening chords before and after milling.

20-74. Clearance and Relief Angles Play a Part in Cutter Performance. M. Martellotti. *American Machinist*, v. 89, March 15, '45, pp. 119-122.

Number of teeth and proper chip clearance may be found from the material cut and the nature of the milling operation.

20-75. Practical Ideas. *American Machinist*, v. 89, March 15, '45, pp. 123-128.

Modified Chuck Insures Accurate Centers on Propeller Shafts. Wear Reduced by a Self-Adjusting Trolley Shoe. Lifting Rack Expedites Handling of Heavy Hydraulic Press Dies. Slip-On Turnbuckle Tightener Helps in Cramped Spaces. Shop Truck With Overarm Transports Rings Without Damage. V-Block Reduces Time of Cutting Keyways in Round Stock. Portable Grinding Device Resurfaces Hoist Drums in Place. Pin Router Attachment Gages and Controls Depth of Cuts. Fixture for Straightening Bent or Twisted Band-Saws. Burrs on Screwheads Removed by Modified Screwdriver. Boring Bars Interchanged Without Disturbing the Toolholder. Tool for Setting Small Studs Works in Close Quarters. Spring Collet Used in Die to Hold Down Pierced Slugs. Electric Heater Softens Plastic Tubing. Pipe Bending Indicator Eliminates Cut and Try Methods.

20-76. Tooling Instrument Work for Factory Production. Panoramic sight, its construction and use; machining, assembly and testing methods used in optical instrument manufacture; tools used in the manufacture of the panoramic sight.

20-77. From Gadget to Stratoliner. W. Hart Nichols. *Tool Engineer*, v. 14, Feb. '45, pp. 41, 54.
Development of a pantograph-type profiling machine for making accurate model airfoils for wind-tunnel tests.

20-78. The Common Sense of Tooling. Charles Marvin. *Tool Engineer*, v. 14, Feb. '45, pp. 42-43.
Tools must be fool-proof; pooled ideas—better tools; ever-changing tool program; plan for constant improvement.

20-79. Bench Drill Press Spindles Driven Through Universal Joints. Harry L. Giwosky. *American Machinist*, v. 89, March 1, '45, pp. 115-116.
Vertical motor supplies power for two-spindle unit. Records show that less maintenance is required than on gear types.

20-80. Practical Ideas. *American Machinist*, v. 89, March 1, '45, pp. 119-124.
Indexing milling fixture takes standard collets. Simplified toolholders reduce set-up and tooling time. Fixture for expediting machining of small parts on a lathe. Tubing straightened in a jig without flattening or nicking. Guide control provides time-saving adjustment for a power brake. Track-mounted portable grinder for finishing long castings. Automatic feed cuts in half time for hardness testing. Bushing plate with indexing drill speeds drilling of bolt circles. Jig automatically determines correct alignment of shafting. Vernier for a machinist's steel scale simplifies measuring. Painting inside of open-ended cylindrical products. Cutting-off toolholder useful in small shop production.

20-81. A Study of Some Fundamentals When Face-Milling Steel with Carbides. Fred W. Lucht. *Mechanical Engineering*, v. 67, March '45, pp. 185-189.
Report on the progress of the investigation on radial rakes to date. This study is still in progress because it is thought that the use of the proper radial rakes on a cutter, the correct method of maintaining them, and the correct method of positioning them in relation to the point where the tooth enters the work, all have a direct bearing on the success or failure of a steel-milling operation.

20-82. Machining Magnesium. A. M. Lennie. *Aluminum & Magnesium*, v. 1, Feb. '45, pp. 17-21, 30-31.
Carbide tool recommended; fire hazard not serious; magnesium pieces difficult to ignite; recommended extinguisher; fire precaution necessary; fire record low; causes of warpage; how to control temperature; to eliminate drilling difficulties; reaming problem solved; good machinability of magnesium alloys.

20-83. Machinability of Copper Alloys. D. K. Crampton. *Metal Industry*, v. 66, March 9, '45, pp. 150-152.
Shows how machinability is related to the nature of the dispersed phase, the composition, the previous cold work and the nature of the cutting operation. (From *Metal Progress.*)

20-84. Further Tests Reported on Carbide Hobs. *Iron Age*, v. 155, March 15, '45, pp. 55-57.
As a result of a new series of operational tests conducted at the Joshua Hendy Iron Works with a composite hob fitted with cemented carbide strip teeth, 80% saving in the time of cutting big marine gears may be expected. Carbide tipped hobs may be operated safely at speeds up to 300 ft. per min.

20-85. Power Feed Aids Contour Shaping. *Iron Age*, v. 155, March 15, '45, p. 65.
An increase in production of better than 500% on trimming irregular edges of aircraft parts through an adaptation of a standard woodworking shaper, equipped with a power feed.

20-86. Production Tooling for Forming, Welding and Machining. E. Almdale. *Production Engineering & Management*, v. 15, March '45, pp. 65-70.
Line production methods are employed by Midland Steel Products Co. to manufacture Navy ammunition cases and gun mounts. Similarity of methods used to work different materials to meet dissimilar design requirements indicates wide range of possibilities for smart tooling job.

20-87. Revolving Broach Heads. David A. Swanson. *Production Engineering & Management*, v. 15, March '45, pp. 71-72.
First operation broaching on screw machine can reduce non-productive handling time when applied to relatively soft materials or light cuts.

20-88. The "Tooling Ways." Thomas A. Dickinson. *Production Engineering & Management*, v. 15, March '45, pp. 73-76.
Completely coordinated locations in three dimensions are rapidly established on new device. An offspring of Consolidated Vultee's tooling dock, the "Tooling Ways" is economical in original cost and application.

20-89. New Machines and Tools Speed Production 200%. *Production Engineering & Management*, v. 15, March '45, pp. 78-86.
Modern equipment and ingenious fixture design provide production advantage of two-to-one, slash man-hour requirement from 14 to 8.

20-90. Tap Grinding on Production. J. Dauber and A. Gabriel. *Production Engineering & Management*, v. 15, March '45, pp. 87-88.
Specially designed equipment permits indexing rough threaded taps and clamping turning dog before placing taps in grinder. Pilot tap setup in grinder is referred to projector used in further setups.

20-91. Milling Flats on Round Parts. *Production Engineering & Management*, v. 15, March '45, p. 99.
Inexpensive high production fixture, developed for milling wrench flats on ordnance parts, is applicable to variety of similar jobs.

20-92. 80-Ton Martin Mars Tooled for Production. C. W. Shipley. *Production Engineering & Management*, v. 15, March '45, pp. 101-104.
Economical tooling for limited aircraft production. Details provide contrast to high production tooling costs which are amortized over thousands of units.

20-93. Diamond Abrasive Wheels Sharpen the Teeth of Industry. Willard N. Pratt. *Western Metals*, v. 3, Feb. '45, pp. 24, 27.
Extreme hardness; temperatures.

20-94. Favored Practice in Machining Zinc Alloy Die Castings, III. *Die Casting*, v. 3, March '45, pp. 64, 66, 71.
Recommended methods for machining zinc alloy die castings and a discussion of facing and turning procedures.

20-95. Modified Drill Design Increases Tool Life and Production Rate. Roy W. Parkinson. *Machinery*, v. 51, March '45, pp. 156-161.
Modified design of spade drill was found to provide increased production speed and longer life between grinds.

20-96. The Machining of Magnesium Castings. *Machinery*, v. 51, March '45, pp. 169-171.
Many points to be considered wherein the practice differs from that used for other metals.

20-97. Selecting the Correct Speeds and Feeds for Cylindrical Grinding. S. S. Shoemaker. *Machinery*, v. 51, March '45, pp. 184-185.
Rotational speeds of wheel and work.

20-98. Man-Au-Trol—A New Automatic Machine Tool Control. *Machinery*, v. 51, March '45, p. 194.
Device provides a new system of control which is said to manage all functions of a machine better than the human mind and experienced hands can do. It embodies a completely automatic control of machines to which it is applied; yet it is an independent unit that is not actually built into the machine.

20-99. Crush Dressing of Grinding Wheels. Carl J. Linxweiler. *Steel*, v. 116, March 26, '45, pp. 96-98.
Method of profiling grinding wheels through the use of roller formers has developed beyond the laboratory stage and now emerges as a valuable production technique.

21. LUBRICATION AND FRICTION; BEARINGS

21-19. Bearing Corrosion Characteristics of Lubricating Oils. C. M. Loane and J. W. Gaynor. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Feb. '45, pp. 89-95.
Only practical correlation is that between laboratory tests and standard accelerated engine tests. Study is limited to a comparison of laboratory corrosion test results with Chevrolet 36-hr. test results. Demonstration of the enormous effect, specific to certain oils, of the several catalysts used. 14 ref.

21-20. Lubrication. *Automobile Engineer*, v. 35, Jan. '45, pp. 21-23.
Newer aspects created by super finishing.

21-21. Notes on the Use of Coolants. John E. Hyler. *Modern Machine Shop*, v. 17, March '45, pp. 136, 138, 140, 142, 144, 146.
A few pointers which should be useful to buyers and users of coolants.

21-22. Lubrication in Deep Drawing Metals. Samuel Spring. *Steel*, v. 116, March 19, '45, pp. 112-113, 150, 152, 154.
Nature of metal surfaces; types of friction; lubrication; reduction of friction. 18 ref.

21-23. Additives in Oil for the Steel Plant. C. E. Pritchard. *Iron and Steel Engineer*, v. 22, March '45, pp. 75-84.
Additives impart to an oil specific properties which are lacking in the conventionally refined petroleum product, enabling it to meet the requirements of specific applications.

21-24. Positive Automatic Lubrication. R. L. Harter. *Steel*, v. 116, March 12, '45, pp. 110-112, 114, 152, 154.
Both over and under lubrication are avoided, bearing failures prevented and important economies obtained through use of lubricating systems which synchronize rate of supply with rate of consumption.

21-25. Gearing Lubrication Standard Set Up by A.G.M.A. *Iron Age*, v. 155, March 15, '45, pp. 69-72.
American Gear Manufacturers Association standard covers the method of lubricating and the type and grade of oil to be used in enclosed gear drives and open gearing. It is applicable to various types of gearing.

21-26. Lubrication in Deep Drawing Metals. Samuel Spring. *Steel*, v. 116, March 26, '45, pp. 100, 102, 104, 132, 138, 140, 142, 144.
Defines and describes what occurs in "boundary" lubrication, implemented by physical or chemical adsorption; in "extreme pressure" lubrication with sulphurized oils and other types; and in "wear" effected by abrasive or corrosive action, oxidation or welding of metals. 24 ref.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-94. Controlled Atmosphere Furnace Brazing. A. K. Phillippi. *Industrial Heating*, v. 12, Feb. '45, pp. 222, 224, 226, 228, 230, 232.
Recommended practices, limiting factors, types of furnaces employed and their auxiliary equipment. Selection of heating equipment of the proper capacity. The advantages to be gained by the adoption of controlled atmosphere furnace brazing as a method of fabrication in those applications where it is feasible to do so, and where savings in cost may be expected.

22-95. Diversity of Structures Produced with New Process of Automatic Welding. *Steel Processing*, v. 31, Feb. '45, pp. 103-106.
One Ohio firm's utilization of single automatic welding unit for widely diversified types of assemblies which suggests the flexibility and all-around usefulness of this latest advancement in automatic welding equipment.

22-96. Controlled Atmosphere Furnace Brazing. A. K. Phillippi. *Steel Processing*, v. 31, Feb. '45, pp. 111-114.
If the parts are designed for furnace brazing, economies will be realized because expensive machining operations can be eliminated; the waste of metal in these machining operations can be saved; less material need be purchased; less chips and turnings will have to be handled by the salvage department; and in summing up the whole sequence of operations, it will be found that controlled atmosphere brazing operations result in a saving of both labor and material. Joining metals by atmosphere brazing is economical and basically sound.

22-97. Design Considerations in Resistance Welding. A. J. Hipperson. *Welding*, v. 13, Jan. '45, pp. 582-590.
Reviews the strength to be expected from different types of resistance welds, and the location of the welds with respect to the component parts. Also discusses the possibility of standardizing the use of symbols for resistance welds. 2 ref.

A.S.M. Review of Current Metal Literature—*Continued*

22. JOINING (*Cont.*)

22-98. **Argon-Arc Welding.** *Welding*, v. 13, Jan. '45, pp. 591-594.
The development of a new process to avoid the difficulties which are present when using oxy-acetylene welding on magnesium alloys. It is stated that the new process offers a satisfactory means of obtaining sound, consistent welds in magnesium alloys from the consideration of both strength and metallurgical structure.

22-99. **Power Factor Correction of Resistance Welders.** W. B. Best. *Welding*, v. 13, Jan. '45, pp. 595-599.
Considers the large spot welder having a load factor of the order of 20%. If a condenser is permanently connected in parallel and if the capacity be calculated for the welding condition, practically the whole of the condenser capacity is superfluous as regards the welder for, say 80% of the connected time. This excess capacity may be so great as to cause over correction of other plant during periods when the welder is on open circuit.

22-100. **Electrode Coatings.** G. Haim. *Welding*, v. 13, Jan. '45, pp. 600-604.
Rapid determination of moisture content. 2 ref.

22-101. **Repair of Worn Rails.** *Welding*, v. 13, Jan. '45, pp. 605-606.
Introduction of non-ferrous running surfaces.

22-102. **Ice Damage Repairs to a Liberty Ship.** J. K. Johannesen. *Welding*, v. 13, Jan. '45, pp. 614-618.
Presents details of repairs which were carried out on a partially welded ship and outlines the difficulties encountered and how they were overcome. A prefabricated ship may be more costly to repair but the superior strength of the welded design should reduce the extent of the repairs necessary.

22-103. **Trends in the Use of Welded Machinery Parts.** Edward J. Charlton. *Welding Journal*, v. 24, Feb. '45, pp. 113-124.
Limited to components fabricated from low-carbon hot-rolled steel and its related alloys.

22-104. **Control of Welding Fumes — Why and How.** Morwick Ross. *Welding Journal*, v. 24, Feb. '45, pp. 124-126.
Brief review of the effects of exposures to welding fumes in shipyards today. It scarcely begins to tell the whole story, but it serves as one good reason why welding fumes must be controlled.

22-105. **Multiple and Stack Machine Cutting.** A. H. Yoch. *Welding Journal*, v. 24, Feb. '45, pp. 127-138.
The success of stack cutting is dependent first upon thoroughness of advance preparations of the plates and, second, upon the proper technique of operation. The first prerequisite is composed of the three factors: (1) proper cleaning, (2) proper stacking, and (3) proper clamping.

22-106. **High Lights of Hard-Facing Procedure.** R. L. Lerch. *Welding Journal*, v. 24, Feb. '45, pp. 139-143.
Article written with special reference to the use of Haynes Stellite hard facing rod. Figures on savings and increased life are based on the use of this material.

22-107. **Safety Factors in Arc Welding.** R. F. Wyer. *Welding Journal*, v. 24, Feb. '45, pp. 146-150.
Safety factors in arc welding from the electrical point of view.

22-108. **Aluminum Spot Welding Tips.** Eugene J. Peltier. *Welding Journal*, v. 24, Feb. '45, pp. 151-153.
Outlines several points in aluminum spot welding which need special analysis.

22-109. **Welding versus Riveting on Hopper Dredge Construction.** S. E. Lawrence. *Welding Journal*, v. 24, Feb. '45, pp. 155-158.
Desirability of proper design for either welding or riveting in work of this type. Great field for savings to be effected in a plant in transition by following through from design to finished product, savings of weights of metals, economy of shapes, easier fabrication of sheets, simplification of fittings—dead weight saving of welding rods over rivets, etc. Savings of time were found harder to equate, due in part to the fact that facilities were not previously provided to expedite welding operations and due to lack of time to work out the simplest, most economical manner of welding a seam, i.e., whether overhead, down welding, side welding, etc. Units of price work costs were difficult to reduce to a common denominator for comparison.

22-110. **Welding of Dissimilar Metals.** W. Spraragen and D. Rosenthal. *Welding Journal*, v. 24, Feb. '45, pp. 65s-85s.
Properties of the joint are dependent primarily on the nature of the bond itself. The bond may be secured by the three following means: alloying, surface tension as in tinning, soldering or brazing (perhaps with some alloying) and intergranular penetration. Dissimilar ferrous metals; welding ferrous to non-ferrous metals; dissimilar non-ferrous metals. 130 ref.

22-111. **Lincolnweld Automatic Welder Shows Operating Economies.** C. M. Taylor. *Iron Age*, v. 155, March 1, '45, pp. 47-49.
In the fabrication of hatch covers for cargo ships, welding costs have been cut in half compared with manual methods. Details on the equipment are announced for the first time.

22-112. **Safety Factors in Arc Welding.** R. F. Wyer. *Railway Mechanical Engineer*, v. 119, March '45, pp. 128-131.
Hazards and required safety practices from the electrical point of view.

22-113. **The Flame Cutting of Steel.** Chas. A. E. Wilkins and Wm. J. Currie. *Metal Treatment*, v. 11, Winter '44-'45, pp. 259-265, 272.
Demonstrates how precision flame cutting has effected considerable saving in both time and production costs in the engineering industry. Stresses the importance of understanding the mechanics of the cutting process, and of appreciating the metallurgical reactions involved. Flame cutting has many advantages but one of its greatest is the way it eliminates superfluous machining operations.

22-114. **Welding Requirements for Various Stainless Steels.** W. J. Conley. *American Machinist*, v. 89, March 15, '45, pp. 112-115.
Choice of electrodes and other welding factors discussed.

22-115. **Destructive Effect of High Temperature Solders on Copper Wire.** R. H. Bailey. *Wire & Wire Products*, v. 20, March '45, pp. 197-199.
Life and diameter of any small to fine-size copper wire in any solder is decreased with increasing molten solder temperatures. Higher the tin content of tin-lead solder, the shorter is the life of a given wire in that solder for any given solder temperature.

22-116. **The Welding of Non-Ferrous Metals.** E. G. West. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 317-326, 327.
Weldability; differences between fusion and pressure processes; special technique necessary for non-ferrous metals; fusion processes; pressure processes; brazing; physical properties, effect of alloying additions on physical properties; mechanical properties; chemical and physico-chemical properties; gas solubility; metallurgy of non-ferrous welds; cast metal. 6 ref.

22-117. **Producing Gas Welded Tubing From 2500-Pound Coils of Strip.** J. N. Bohannon and F. Judelsohn. *Steel*, v. 116, March 5, '45, pp. 124-125, 140, 142.
Welding head with preheating, heating and welding section is built longer than average unit and thus provides for high speed production and uniform weld. Double row of orifices extend nearly to end of head. Tunnel in which tubing is given air quench is unique feature of new mill. Final cooling completed by simple water quench.

22-118. **Resistance Welding Machines.** H. O. Willrich. *Welding*, v. 13, Feb. '45, pp. 2-6.
Care and maintenance; electric system; the timing circuit; connection to the power main; air system; water cooling system; method of cleaning; electrode maintenance; seam welding wheels.

22-119. **Carbon Arc Welding.** P. L. Pocock. *Welding*, v. 13, Feb. '45, pp. 7-12.
Survey of the process.

22-120. **Arc Welding Armour Plate.** W. M. Blagden. *Welding*, v. 13, Feb. '45, pp. 13-19.
Design of British fighting vehicles.

22-121. **Welding Metallurgy of Non-Ferrous Metals.** E. A. G. Liddiard. *Welding*, v. 13, Feb. '45, pp. 20-24.
Magnesium base alloys; effect of flux; argon arc welding; welding of copper; prospect of future developments; recrystallization welding.

22-122. **Welded I-Sections.** H. Gottfeldt. *Welding*, v. 13, Feb. '45, pp. 29-34.
Graphical solutions to design problems.

22-123. **What's New in Welding.** *Fortune*, v. 31, March '45, pp. 151-154, 182, 184, 186, 189-190.
New processes, new machines, a million men and women who can handle the "stinger." The prospect: Cheaper and faster metal fabrication in peacetime.

22-124. **Some Effects of Surface Decarburization on Flame-Cutting Characteristics of High Carbon Bar Stock.** *Canadian Metals & Metallurgical Industries*, v. 8, Feb. '45, pp. 26-28.
Presented with the view that it will have further practical applications, particularly so considering the current trend towards the use of flame-cutting processes as initial machining operations with consequent savings realized through the reduction in the amount of waste material to be removed by rough machining.

22-125. **The Copper-Brazing of Steel Assemblies.** J. D. Jevons. *Overseas Engineer*, v. 18, Nov. '44, pp. 28-31, 50. Iron and Steel Institute *Bulletin*, no. 109, Jan. '45, p. 80-A.
A description is given of the copper-brazing process. Under industrial conditions it consists of assembling steel components with definite clearances and in such a manner that they remain in the desired position until the joint is made; pure copper in the form of wire, foil or powder (made up as a paste) is placed in a position from which, when molten, it will flow readily into the spaces to be filled; the assembly is heated and held for 5 to 10 min. at about 1120° C. in a reducing atmosphere and then cooled, usually in the same atmosphere, by passing through a tunnel furnace with a cooling zone.

22-126. **The Study of Electrode Tip Wear in the Spot Welding of Mild Steel Sheet.** W. S. Simmie. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 135-140.
Amount of tip wear obtained depends upon the shape of the electrode tip. It can be reduced by using chromium-copper. Increase in tip area is not related to the increase in actual contact area.

22-127. **Oxy-Acetylene Welding; a Survey of Problems Associated With Design and Technique.** F. Clark. *Sheet Metal Industries*, v. 21, Jan. '45, pp. 141-145, 150.
Satisfactory welding depends upon team work from the time welding is considered by the designer and the engineer, until it is completed by the welder. Care of preparation of welding edges, the spacing of the joints and alignment are as important for welding as the setting out and drilling of rivet holes are for riveting. Variation of angle of bevel will upset initial calculations for time and cost and add unnecessarily to the welders' difficulties. The wider the vee the more weld metal will be required, the slower will be the welding speed and the greater the gas consumption. Careful clamping or use of property designed jigs is frequently warranted.

22-128. **Fusion Welding Copper, Brass and Bronze.** H. R. Morrison. *Welding Journal*, v. 24, March '45, pp. 225-230.
Weldable alloys of copper fall into four general groups: Copper and those other materials that contain a small enough percentage of alloying elements or impurities to be considered in the same class with copper; copper-zinc alloys, or brasses; copper-tin alloys, or bronzes; copper-silicon alloys, including Everdur metal. Each group consists of alloys of copper that have welding techniques, properties and characteristics that are alike or very similar.

22-129. **Electric Arc Welding Helps Make Mass Production of Penicillin Possible.** G. G. Landis. *Welding Journal*, v. 24, March '45, pp. 232-234.
Officials of the 19 principal plants in the United States, which are said to produce about 95% of the world's supply of penicillin, agree that without the benefits of modern welding techniques, it would not have been possible to reach today's peak of penicillin production which is expected to soon exceed a volume sufficient to treat 250,000 serious infections per day.

22-130. **Failure of Spherical Hydrogen Storage Tank.** A. L. Brown and J. B. Smith. *Welding Journal*, v. 24, March '45, pp. 235-240.
A spherical hydrogen storage tank failed structurally with explosive violence. It was made of welded steel plate, and materials, design and erection were in accordance with the American Society of Mechanical Engineers' Code. Occurrence of fractures; the cause; description of sphere; improbability of internal explosion; the manhole; description of manhole; residual shrinkage stresses from welding; sheared edge of manhole neck; stresses from internal gas pressure; cumulative effect of stresses and sheared edge.

22-131. **Production Problems and Production Control.** E. C. Brekelbaum. *Welding Journal*, v. 24, March '45, pp. 241-246.
New production welding system (based on the base-rate-plus-premium method of compensation) which does precisely what its name implies—it provides a complete control of all phases of welded fabrication. It employs the use of arc timers and recorders which will be explained.

22-132. **Technical Control of Welding in Ship Construction.** M. H. MacKusick. *Welding Journal*, v. 24, March '45, pp. 247-253.
Incentive systems of pay; qualifications of welding operators; organization for shipyard welding production; automatic welding; planning for subassembly; thermit welding.

22-133. **Controls Required for Safe and Economical Construction of Welded Ships.** Donald G. Maxson. *Welding Journal*, v. 24, March '45, pp. 255-264.
To sum up a few of the most pertinent premises necessary to the construction of safe and economical all-welded ships; it appears very evident that the following must be observed: (a) A basic policy; (b) control of residual stresses; (c) inspection.

22-134. **Some Applications of Welded Aircraft Tubing.** J. S. Adelson and Park Hill. *Welding Journal*, v. 24, March '45, pp. 267-269.
Engine mounts; aircraft intake tubes; aircraft exhaust header.

22-135. **Weldability; Hot-Rolled Versus Quenched and Tempered Constructional Steels.** S. A. Herres. *Welding Journal*, v. 24, March '45, pp. 129s-152s.
Develops a comparison between the weldability of several steels in various heat treat conditions; considers what weldability means and how it can be evaluated and specified. 23 ref.

22-136. **Spot Weld Characteristics of Heavy Gages of 24S-T Alclad Aluminum Alloy.** M. L. Ochieano. *Welding Journal*, v. 24, March '45, pp. 157s-166s.
Characteristics of spot welds made on a double-impulse d.c. welder. Tests were conducted to determine shear and tension strengths and consistency on 0.091, 0.102 and 0.125 24S-T Alclad. Program expanded to include 0.156 24S-T Alclad. Tests were conducted on shear strength specimens only.

22-137. **Spot Welding High-Tensile Steels with Automatic Post-Heat Treatment.** W. S. Simmie and A. J. Hipperson. *Welding Journal*, v. 24, March '45, pp. 174s-182s.
Determines the extent to which spot welds in certain high tensile steels can be made sufficiently free from brittleness for structural purposes by means of the passage of a post-heat treatment current of short duration in the spot-welding machine, following the actual welding cycle. 4 ref.

22-138. **Summary of Observations of Cracking in Spot Welds in Alclad 24S-T.** Robert A. Wyant. *Welding Journal*, v. 24, March '45, pp. 183s-185s.
Summarizes the information on cracking that has been more fully discussed in the progress reports from Welding Laboratory, Rensselaer Polytechnic Institute.

22-139. **Investigations Into Manual High-Speed Arc Welding.** E. S. Waddington. *Sheet Metal Industries*, v. 21, March '45, pp. 501-508.
Discusses the main factors in welding costs: Cost of preparation; the welder's time; the cost of the electrode; the cost of current.

22-140. **The Welding of Non-Ferrous Metals.** E. G. West. *Sheet Metal Industries*, v. 21, March '45, pp. 509-513.
Metallurgy of non-ferrous welds. 4 ref.

22-141. **The Welding of Process Piping.** Arthur N. Kugler. *Heating and Ventilating*, v. 42, March '45, pp. 65-68.
How to join one metal with another. Influence of lead on welding; welding copper to copper; electrolytic copper.

22-142. **Tank Fabrication Costs Reduced by Automatic Arc-Welding Method.** C. M. Taylor. *Machinery*, v. 51, March '45, pp. 172-173.
Cost reduction of more than 40% over manual welding has been achieved in storage-tank fabrication by the automatic "Lincolnweld" method.

22-143. **Welded Construction of Blast Furnaces.** Bruce E. Tau. *Blast Furnace and Steel Plant*, v. 33, March '45, pp. 343-369-370.
Preparation of material for welding; erection and assembly; positioning, securing, and aligning plates; technique of welding; control of welding quality.

22-144. **Brazing Speeds Aircraft Construction.** *Iron Age*, v. 155, March 15, '45, pp. 66-68.
Part or application; metals joined; type of joint; alloy used.

22-145. **Supervisory Hints for Increased Production.** R. Kraus. *Industry & Welding*, v. 18, March '45, pp. 35-37.
Observations confined to general principles involving welded fabrication and operations connected with it.

22-146. **Flame Cutting—Metal Spraying.** William J. Murray. *Industry & Welding*, v. 18, March '45, pp. 38-39, 42.
New manufacturing methods and procedures result in great improvement.

22-147. **Design of Welded Machinery.** John Mikulak. *Industry & Welding*, v. 18, March '45, pp. 43-44, 46, 91-96.
Selection of materials; joint design; procedure for welding; design trends.

22-148. **War Welding Developments for Peacetime Products.** J. M. Diebold. *Industry & Welding*, v. 18, March '45, pp. 48-50, 52, 54, 76-81.
New production techniques succeeded in applications hitherto considered impractical, and now forecast tremendous improvements in the peacetime products to come.

22-149. **New Variation in Tool Joint Hard Facing Technique.** *Industry & Welding*, v. 18, March '45, pp. 56-58.
Covers approximately the same surface but the method of applying the hard metal is novel. A handwheel or chain wrench is used to rotate the pipe upon which a circumferential bead of high carbon is applied in a continuous spiral around the joint. Beads are spaced about ¼ in.

22-150. **Interval Timer, A-C Arc Welder Power Supply Among Subjects Discussed at A.I.E.E. Winter Technical Meeting.** *Industry & Welding*, v. 18, March '45, pp. 66, 68-69.
Interval timer for arc duration; power supply for a.c. arc welding; analysis of arc welding reactors.

22-151. **Properties of Stainless Steels Affect Welding Methods.** W. J. Conley. *American Machinist*, v. 89, March 1, '45, pp. 91-94.
One type of stainless steel is soft after welding; another is relatively brittle. These and other facts about the material discussed. Some of the new applications developed during the wartime emergency are also reviewed.

22-152. **Welding Light-Gage Steel.** R. V. Anderson. *Steel*, v. 116, March 12, '45, pp. 104-105, 150.
At high speed by submerged arc process facilitated by new developments in fixtures.

22-153. **New Silver Soldering Technique.** *Sheet Metal Worker*, v. 36, Feb. '45, pp. 35-36.
New technique for the use of silver solder and other low melting point alloys has practically eliminated the principal non-productive finishing operations. Essence of the improvement is the automatic supply of the flux to the joint in the correct amount and at a uniform rate.

22-154. **Skip Welding Prevents Distortion.** E. J. Henderson. *Iron Age*, v. 155, March 15, '45, pp. 63-65.
Unusual procedures worked out in the fabrication of naval cartridge case chutes from high tensile formed steel plate and stainless steel bars.

22-155. **Hazards in Arc Welding.** R. F. Wyer. *General Electric Review*, v. 48, March '45, pp. 20-25.
Facts replace rumors. Real dangers analyzed. Safety education and proper maintenance remove most hazards.

22-156. **Automatic Arc Welding of Aluminum Structures.** W. J. Conley. *Iron Age*, v. 155, March 22, '45, pp. 54-55.
Smooth welds can be obtained in ¼-in. aluminum carbon sheets at speeds up to 16½ in. per min. with automatic arc welding equipment, without the necessity of beveling the edges of butt welds. The automatic carbon arc process for welding aluminum described is now being used on a vast scale to fabricate special military bridge structures.

22-157. **Metal Cleaning Before Silver Brazing.** Jean Gauthier. *Iron Age*, v. 155, March 22, '45, pp. 56-58.
Common cause of trouble in silver brazing operations is poorly cleaned surfaces. Alkaline and acid cleaning solutions used with proper pH control can consistently provide chemically clean surfaces necessary for joining any metal surfaces.

22-158. **Developments in Arc Welding.** *Sheet Metal Worker*, v. 36, March '45, pp. 47-48.
Improvement in electrodes—increase in speed using less deposited metal, reducing man hours and cost.

22-159. **Low Temperature Welding in Steel Plant Maintenance.** R. D. Wasserman. *Iron and Steel Engineer*, v. 22, March '45, pp. 70-74, 84.
By proper choice of welding alloys for the material to be joined, welds can be made at temperatures materially lower than normal. The characteristics of these low temperature welds and the ease of their application open a wide field of use in plant maintenance.

22-160. **Welding in Steel Construction Work.** L. E. Browne. *Steel*, v. 116, March 26, '45, pp. 115, 146, 148.
Presents opinions from a cross-section of leading structural shop engineers and designers; some connected with large-tonnage shops and others with smaller companies in all sections of the country.

22-161. **Welding in the Railroad Shop.** Arthur Havens. *Welding Engineer*, v. 30, March '45, pp. 35-37.
Arc and oxy-acetylene welding don't compete in railroad maintenance. Each has its own particular set of maintenance jobs.

22-162. **Welded Gas Generators.** T. B. Jefferson. *Welding Engineer*, v. 30, March '45, p. 38.
Hydrogen to inflate barrage balloons, carbon dioxide to fight fires—both of these gases are being manufactured on the battle front in portable, all-welded generators.

22-163. **Self-Descaling Evaporator Tubes.** Clyde B. Clason. *Welding Engineer*, v. 30, March '45, p. 47.
Fresh water from the sea is now a working proposition for merchant ships. Up to 50 tons daily can be produced in a new sea-water still that uses heat-exchanger tubes made by silver brazing strips of Monel to brass tubing.

22-164. **Welded Aircraft Tubing.** J. S. Adelson and Park Hill. *Welding Engineer*, v. 30, March '45, pp. 48-50.
Tubing is one of the major steel products employed for aircraft construction. The authors of this article tell how it must be fabricated to serve in motor-mount rings, engine intake tubes and stainless steel exhaust headers.

22-165. **The Repair and Salvage of Aluminum Castings by Arc Welding.** C. R. Thatcher. *Aluminum and the Non-Ferrous Review*, v. 9, July-Sept. '44, pp. 35-36, 38.
Electric arc welding used on aluminum castings as formerly used in repairing cast steel and phosphor-bronze castings. Eliminates blowholes which have appeared in the casting, either before or after machining. Corrects machining errors wherever distortion does not present too difficult a problem.

22-166. **Brazing.** *Automobile Engineer*, v. 35, Feb. '45, pp. 69-70.
Current practice in the U.S.A.

23. INDUSTRIAL USES AND APPLICATIONS

23-59. **Piston Rings.** *Automobile Engineer*, v. 35, Jan. '45, p. 28.
Developments in form and material.

23-60. **The Chemical Deposition of Copper Mirrors on Glass.** Evelyn C. Marboe and W. A. Weyl. *Glass Industry*, v. 26, March '45, pp. 119-120, 136-138, 142, 149.
Conditions for the formation of metal mirrors on glass; copper deposition from solutions; copper deposition from solids. 21 ref.

23-61. **Metals Make Railroads.** Fred P. Peters. *Scientific American*, v. 172, March '45, pp. 162-164.
The railroads are planning now to utilize the far-reaching advances made by metals during the war in higher speed, lighter weight rolling stock for both passenger and freight. With this equipment they will meet peacetime competition of the airplane, truck, and bus.

23-62. **The Manufacture of Aircraft Instrument Springs.** J. W. Rockefeller. *Wire & Wire Products*, v. 20, March '45, pp. 189-191, 210.
Making springs for aircraft instruments during the war summed up briefly as doing the impossible—in a hurry. It is doubtful whether there is today, in the United States, a single spring maker who will concede that anything short of accomplishing perpetual motion is beyond the possibilities of a spring.

23-63. **First Aluminum Box Cars Are Delivered.** *Railway Age*, v. 118, March 10, '45, pp. 444-447.
Objectives sought in the design; details of the construction.

23-64. **Installation and Operation of Woven Wire Conveyor Belts: I.** Fred L. Hooper. *Industrial Heating*, v. 12, Feb. '45, pp. 234, 236, 238, 240.
Design, construction, maintenance and operation of industrial woven wire conveyor belts. Special reference to the types of materials available for belt construction, how the type of construction chosen and the inherent heat and corrosion resistance of the selected material affect belt life. Actual installations shown and described to illustrate the practical application of the principles discussed in the earlier sections of the article, in numerous industrial processes.

23-65. **Steel Life Rafts Compartmented Like Battleship.** *Steel Processing*, v. 31, Feb. '45, pp. 87-89.
Made of 16 gage cold rolled steel, each raft is separated into 19 airtight compartments, plus two airtight water tanks. Food and equipment are stored in four compartments near the center, and are reached through large openings in the side of the well deck. The openings are bolted closed by means of screws, which may be removed in a couple of minutes.

23-66. **Building the JMR Mars Flying Boat.** *Modern Machine Shop*, v. 17, March '45, pp. 124-130, 132.
A series of views in the plant of the Glenn L. Martin Co., showing some of the fixtures and tools.

23-67. **Developments in Light-Gage Steel Construction.** Milton Male. *Steel*, v. 116, March 19, '45, pp. 108-110, 146.
Systems fostered by exigencies of World War II feature speed and economy both in fabrication and erection on large-scale building operations.

23-68. **Steel Houses.** *Iron & Steel*, v. 18, Jan. '45, pp. 3-5.
Constructional details of a rapidly assembled permanent dwelling.

23-69. **Light Alloys for Marine Engines.** A. J. Murphy. Institute of Marine Engineering, *Transactions*, v. 57, part 2, 1945, Preprint, 12 pp. British Non-Ferrous Metals Research Association *Bulletin*, v. 25, Jan. '45, p. 4.
Presents characteristics of light alloys which designers will wish to take into account in development of marine engines. Pistons; cylinder heads; wrought light alloys; castings (tensile and fatigue properties); effects of stress concentration; internal stresses in castings.

23-70. **Aluminum: Now a New Metal.** *Modern Industry*, v. 9, March 15, '45, pp. 42-45.
Thirteen advantages; new alloys are stronger; going down; dual economies; quick shifts are a cinch.

23-71. **Unusual Problems Involving Leakage.** Max Walten. *Sheet Metal Worker*, v. 36, Feb. '45, pp. 37, 50.
Details of a copper deck mold and a gutter lining.

23-72. **Chromate Gasketing.** W. J. Montgomery. *Sheet Metal Worker*, v. 36, Feb. '45, pp. 41-42.
Ease of cutting, resistance to fire and water make the chromate gasket more than a substitute for war-scarce rubber gasketing.

23-73. **They Are Replaceable.** A. G. Pogmore. *Die Casting*, v. 3, March '45, pp. 23, 32-33.
Shows two examples of die casting applications common in filter industry.

23-74. **Clear Sighted Objectives Obtained.** D. Voorhies. *Die Casting*, v. 3, March '45, pp. 34-35, 41-42, 44-45.
To Navy men fogged binoculars are intolerable—but how to make such a moving mechanism moisture-proof has been an impossible production problem—until modern die cast parts were used. The lessons gained have application in many fields.

23-75. **Into the Alloy Age.** Fred P. Peters. *Scientific American*, v. 172, April '45, pp. 199-207.
Agonizingly slow was man's early development of the use of metals, but during the last 100 years, and especially the last 50 years, alloys have changed the whole picture of metallurgy. Progress has been breathtaking and today points the way to the unfolding of the alloy age.

23-76. **Metals in the Air.** *Scientific American*, v. 172, April '45, pp. 213-215.
Aviation's present achievements are based on the quantity production of strong, light weight metals. Of these, aluminum is most widely used because it combines the necessary qualities of toughness and lightness with low cost. But steel and magnesium are coming into wide use.

23-77. **Metals of the Future.** *Scientific American*, v. 172, April '45, pp. 216-218.
Chemical industry provides the base from which spring the marvels of metallurgy. Important to tomorrow's applications of metals is the developing knowledge of the rarer elements and their value in extending the usefulness of the more common metals in use today.

23-78. **Plastics Plus Metals.** *Scientific American*, v. 172, April '45, pp. 222-224.
Additional uses for both materials are supplied by skillful application of techniques now developing. Metal coatings for plastics take advantage of characteristics not found in either material alone. Metal inserts and assembly devices offer diversity to the designer.

23-79. **Aluminum and Magnesium in the Electrical Industries.** B. J. Brajnikoff. *Light Metals*, v. 8, Jan. '45, pp. 16-24.
Difficulties encountered in the clamping of steel-cored aluminum cable and the results of Russian research on this. 2 ref.

23-80. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals*, v. 8, Jan. '45, pp. 25-41.
Theory, practice, and operation of the electrolytic condenser. In particular, the properties of the aluminum oxide film.

23-81. **Aluminum in the Chemical Industry.** *Light Metals*, v. 8, Jan. '45, pp. 42-50.
Applicability of aluminum for the construction of various items of apparatus for specific purposes in the fine and heavy chemical industries.

23-82. **Aluminum Hoisting Equipment.** A. G. Arend. *Aluminium and the Non-Ferrous Review*, v. 9, July-Sept. '44, pp. 42-43.
Advantages of light-weight sections; constructional methods involved; comparative weights.

23-83. **Light Alloys in Heavy Engineering.** *Light Metals*, v. 8, Feb. '45, pp. 53-69.
Realized applications of aluminum-base and magnesium-base alloys in the sphere of heavy engineering. Some indications as to lines of future development.

23-84. **New-Type Rolling Stock in Switzerland.** *Light Metals*, v. 8, Feb. '45, pp. 70-78.
Recapitulation of pre-war developments of some of the newer applications of light metals in Swiss rolling stock.

23-85. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals*, v. 8, Feb. '45, pp. 87-100.
Theory and practice of the formulation of electrolytes for electrolytic condensers, and the design and production of such condensers, typical examples and applications.

24. DESIGN

24-26. **Three-Dimensional Contour Control Advances Art of Pattern and Model Making.** *Tool & Die Journal*, v. 10, Feb. '45, pp. 101-103.
New contour controlling technique bids to revolutionize the making of plaster models to intricate contours or profiles. Equipment is known as the Contour Developer and is a product of the Contour Co. of Pasadena.

24-27. **Magnesium Alloys in Design.** E. W. Thomas. *Engineering*, v. 159, Feb. 2, '45, p. 84.
Discussion of design and limiting load.

24-28. **Structural Design Problems of Light Aircraft.** Stanford J. Stelle. *Aeronautical Engineering Review*, v. 4, Feb. '45, pp. 27, 29, 31-32, 37.
If the difficulties outlined are overcome in future light airplanes, the airplanes will cost a fortune, and, because of weight, will be limited to running down some well-paved high-way. It is hoped, however, that such will not be the case and that there will be devised ways and means to produce low cost, well-performing, trouble-free light airplanes. The present ones are good—future ones will be better.

24-29. **Designing of "Trouble-Free" Dies, XLV.** C. W. Hinman. *Modern Industrial Press*, v. 7, Feb. '45, pp. 18, 20.
New ideas for lubricating machines have recently been put in practice that will greatly increase the working life of machines. Up-to-date pressrooms are also beginning to use these ideas. The new Alemite "Coloroute" system is one plan, and in another plan it has been proposed to build a centralized lubricating system as integral equipment within every new machine. The latter plan is of course the ideal condition.

24-30. **Some Basic Principles of Plasticity for Die Designers.** William Schroeder. *Modern Industrial Press*, v. 7, Feb. '45, pp. 30, 32, 34.
Some of the most fundamental and valuable principles of plasticity reviewed. 6 ref.

24-31. **Solving Compound-Angle Problems.** Holbrook L. Horton. *Machinery*, v. 51, March '45, pp. 177-183.
Fundamental types of problems to be considered.

24-32. **Design Rules—XI.** Herbert Chase. *Die Casting*, v. 3, March '45, pp. 24, 27, 29, 31, 32, 51-52.
Use of inserts wherever results cannot be secured by other expedients at lower cost, or where economies not otherwise attained are realized.

24-33. **Gaskets in Design.** Roger W. Bolz. *Machine Design*, v. 17, March '45, pp. 151-156.
General steps that may be followed as an aid in the selection of compression gaskets, regardless of the nature of the equipment in which they are to be used or the details of the closure design.

25. MISCELLANEOUS

25-27. **General Production Control System.** B. G. L. Jackman. *Sheet Metal Industries*, v. 21, Feb. '45, pp. 283-291.
Material batching, size of batches, build specification, works orders.

25-28. **Materials Handling.** R. W. Mallick. *Machine Tool Blue Book*, v. 41, March '45, pp. 199-200, 202, 204, 206, 208.
Materials handling today still constitutes the greatest single item of labor cost in most industries, and yet the engineering effort put forth to solve this problem is not in direct proportion to the effort expended in other fields.

25-29. **Material and Process Selection.** E. P. Strothman. *Iron Age*, v. 155, March 1, '45, pp. 40-46.
Metal selection for a given end-product is not always simple or apparent. Production methods often are of more importance than physical properties of the metal or its price. One excellent example of this, herein, is the substitution of steel for magnesium in the B-29 nose frame. (Paper presented originally before the S.A.E. in Detroit.)

25-30. **Metals in War and Peace.** T. A. Solberg, American Society of Naval Engineers *Journal*, v. 57, Feb. '45, pp. 56-64.
Under the stimulus of this war, the scientific universe has been tremendously expanded. Fronts in the fields of medical science, metallurgy and electronics have pushed forward no less rapidly than our fronts in the field of battle.

25-31. **Selective Fits Are Easily Specified If Simple Instructions are Followed.** John Gaillard. *American Machinist*, v. 89, March 1, '45, pp. 108-111.
If the shop cannot work to hole and shaft tolerances on prints, or their cost is excessive, the use of selective fits will allow larger manufacturing tolerances which are split in several zones. In general, selective fits must be designed to suit each case. By compiling basic information for such cases, companies can set up tables of selective fits for their various products.

Metal Literature Review—*Continued*

25. MISCELLANEOUS (*cont.*)

25-32. **Two Aircraft Engines Built on One Assembly Line.** *American Machinist*, v. 89, March 1, '45, pp. 106-107.
Chevrolet's car-assembly lines turned out many sorts of body types and equipment options; the same scheduling methods control flow of subassemblies and parts for assembly of P. & W. engines.

25-33. **Truck-Tow Conveyors.** *Steel*, v. 116, March 12, '45, pp. 124, 170, 172.
Answer to difficult job of intra-plant handling.

25-34. **Plant Layout, Materials Handling.** R. W. Mallick. *Industry & Power*, v. 48, March '45, pp. 66-67.
Engineering efforts must be intensified to solve the problems of efficient plant layout and economical materials handling.

25-35. **An American Metallurgical Survey.** *Chemical Age*, v. 52, Feb. 3, '45, pp. 126-127.
Summary of results of survey of wartime engineering achievements, conducted by *Metals & Alloys*. Light metals; National Emergency steels; foundry industry changes; centrifugal casting; powder metallurgy; miscellaneous developments.

25-36. **Better Handling for Lower Costs Now and Post-War.** Harvey C. Erdman. *Factory Management and Maintenance*, v. 103, March '45, pp. 105-108.
Carefully planned materials handling system, operated with a minimum of manpower, has made it possible for the National Screw & Mfg. Co., Cleveland, to meet the tremendously increased demands for fasteners by war industries without losing sight of costs. Five separate conveyor systems, power trucks and tractors, and overhead cranes supply the answer to the company's problem for efficiently handling more than 175,000 pounds of fasteners daily.

26. STATISTICS

26-56. **The Future of Aluminum.** *Metal Industry*, v. 66, Feb. 9, '45, pp. 82-84.
Plea for more informative publicity on the post-war prospects of aluminum and its alloys. It is suggested that a reduction in the number of alloy compositions would be of great benefit to the designer.

26-57. **The Past and Future of Steel.** C. H. Desch. *British Steelmaker*, v. 11, Feb. '45, pp. 52-58.
Damascus swords; puddled iron; crucible process; bessemer process; open-hearth process; electric furnace; direct reduction process; ore beneficiation; sintering.

26-58. **Sees Tight Copper Supply Situation in '45 Unless Domestic Production Is Increased.** F. H. Hayes. *Metals*, v. 15, Feb. '45, pp. 5-7, 14.
Mines need 4,000 additional workers to maintain present output of 73,000 tons monthly—larger imports will supply war needs.

26-59. **Over 90,000 Tons of Lead Needed per Month to Satisfy Needs of Consuming Industries.** Felix Edgar Wormser. *Metals*, v. 15, Feb. '45, pp. 8-10.
Domestic mines to supply 32,000 tons, scrap 30,000 tons, imports 20,000 tons; curtailment needed to save stockpile.

26-60. **North American Silver Production in 1944 Dropped Sharply; U. S. Holdings Also Down.** *Metals*, v. 15, Feb. '45, pp. 11-14.
Estimated decline was 11% for Mexico; 17% for U. S.; 20% for Canada; Peru's output reported unchanged.

26-61. **10-Year Stockpiling Program for Strategic Metals Urged by Army-Navy Munitions Board.** *Metals*, v. 15, Feb. '45, pp. 15-18.
Other developments in month include drop in output of copper, new lead restrictions; zinc to be allocated.

26-62. **British Producers Get Breathing Spell by U. S. Decision to Purchase Empire Copper.** L. H. Tarring. *Metals*, v. 15, Feb. '45, pp. 19-20.
Affords government and mining officials opportunity to plan for future disposal of Canadian and Rhodesian copper output.

26-63. **Copper Production.** F. H. Hayes. *Mining Congress Journal*, v. 31, Feb. '45, pp. 52-55.
Manpower losses are responsible for decrease in domestic production—imports have increased.

26-64. **Lead.** F. E. Wormser. *Mining Congress Journal*, v. 31, Feb. '45, pp. 56-58.
Government stockpile has dropped to less than one month's supply and WPB has ordered drastic cuts in certain uses of lead.

26-65. **Zinc.** Ernest V. Gent. *Mining Congress Journal*, v. 31, Feb. '45, pp. 59-62.
War program indicates heavier calls for zinc in 1945 in the face of reduced labor forces at mines and fabrication plants.

26-66. **Iron Ore.** M. D. Harbaugh. *Mining Congress Journal*, v. 31, Feb. '45, pp. 64-71.
Activity still high though below 1943. Optimism as to war's outcome caused some retardation in production but with change in picture this industry shows re-determination to furnish all the iron ore the country needs.

26-67. **Ferro-Alloy Metals.** E. Franklin Hatch. *Mining Congress Journal*, v. 31, Feb. '45, pp. 72-74.
Continuation of the present status of the ferro-alloy minerals and metals is indicated at least until a major change in war requirements takes place.

26-68. **Gold Mining Looks to the Postwar Era With Confidence.** Merrill E. Shoup. *Mining Congress Journal*, v. 31, Feb. '45, pp. 88-91.
While the gold industry of the United States and Alaska weathered another discouraging year, it faces the future with head unbowed if bloody, and looks forward to the brightest period in its history.

26-69. **Silver.** *Mining Congress Journal*, v. 31, Feb. '45, pp. 92-93.
We are in the midst of an unusual situation which results from a greatly decreased production of silver and a greatly increased demand for silver for industrial and monetary purposes. The increased industrial demand comes largely from war plants and the manufacturers of "non-essential" silverware and jewelry. The increased monetary demand is reflected largely in domestic coinage.

26-70. **Bauxite, Alumina and Aluminum Ingot.** Arthur B. Benefee. *Mining Congress Journal*, v. 31, Feb. '45, pp. 94-97.
By the end of the year the aluminum system had ample stocks of both raw materials and primary and secondary ingot and was operating considerably below its installed capacity.

26-71. **Magnesium.** Arthur Lowery. *Mining Congress Journal*, v. 31, Feb. '45, pp. 97-99.
Many new postwar uses are being forecast for this light metal which is at present well over the production hump.

26-72. **Antimony.** R. G. Hall. *Mining Congress Journal*, v. 31, Feb. '45, pp. 100-101.
Prospects for an increasing demand for antimony are good. Improved metallurgy producing an arsenic-free product will further widen the field.

26-73. **Quicksilver.** Gordon I. Gould. *Mining Congress Journal*, v. 31, Feb. '45, pp. 111-112.
Tariff policy, stockpiling program and new-use possibilities need clarification to bring confidence to domestic producers.

26-74. **Aluminum Prices.** H. F. James. *Metal Industry*, v. 66, Feb. 23, '45, pp. 116-117.
Past record of the aluminum producers guarantees favorable prospects for the consumer in the postwar period.

26-75. **Wartime Accomplishments of Our Metal Industry.** Clyde Williams. *Mining & Metallurgy*, v. 26, March '45, pp. 163-165.
Production and substitution problems successfully solved through cooperation.

26-76. **Canadian Steel.** *Western Metals*, v. 3, Feb. '45, pp. 28, 30, 32.
Dominion plants laying plans for postwar market.

27. NEW BOOKS

27-37. **Handbook of Mineral Dressing; v. 1, Ores and Industrial Materials** (revision of Handbook of Ore Dressing). Arthur F. Taggart, editor. 1939 pp., John Wiley and Sons Co., New York, N. Y. $15.00.

27-38. **Manual of Aircraft Layout.** Rudolph Faltus and Charles Steinmetz. 214 pp., illus., John Wiley and Sons Publishing Co., New York, N. Y. $3.00.
Over-all picture of production with concise information on blueprint reading. Laying out jobs, template development, and machine and hand tools used in template construction. Charts and tables needed in calculations.

27-39. **Process Equipment Design.** Herman C. Hesse and J. Henry Rushton. 580 pp., illus., Van Nostrand, New York. $7.50.
Concerned primarily with design of equipment used in chemical industries. Basic information regarding mechanical properties and strength of materials, riveted and welded vessels, structural analysis, piping, design of gears, shafting and bearings, and handling equipment.

27-40. **Refrigeration and Air Conditioning Engineering.** B. F. Raber and F. W. Hutchinson. 291 pp., John Wiley and Sons Publishing Co., New York, N. Y. $4.00.

27-41. **Henley's Twentieth Century Book of Formulas, Processes and Trade Secrets.** Gardner Dexter Hiscox, editor. Revised and enlarged edition by T. O'Conor Sloane. 900 pp., illus., N. W. Henley, New York, N. Y. $4.00.

27-42. **An Introduction to Electronics.** Ralph G. Hudson. 97 pp., illus., MacMillan Publishing Co., New York. $3.00.
Written for the layman with only an elementary knowledge of electricity, physics and mathematics. Explains what is included in electronics and the part this new science is playing in the research and industrial world.

27-43. **Magnetochemistry.** Pierce W. Selwood. 298 pp., illus., Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. $5.00.
Measurement of magnetic susceptibilities; atomic diamagnetism; molecular diamagnetism; atomic paramagnetism; molecular paramagnetism; complex compounds; metallic dia- and paramagnetisms; ferromagnetism; applied magnetometric analysis.

27-44. **Industrial Electric Furnaces and Appliances, Vol. 1.** Victor A. Paschkis. 232 pp., illus., Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. $4.90.
Selection of furnace types; fundamentals of furnace calculations; fundamentals of furnace economy. Arc type and arc resistor type electrode melting furnaces. Special emphasis is placed upon the thermal aspects of furnace design and operation.

27-45. **Photomicrography.** 174 pp., illus., Eastman Kodak Co., Rochester 4, N. Y. $2.00.
A text that presents a simple discussion of the pertinent fundamentals of optics and photography as well as practical instruction in the technique of photomicrography.

27-46. **German-English Dictionary of Metallurgy.** T. E. R. Singer. 298 pp., McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $4.00.
Intended for technical people using material in the fields of metallurgy, metallography, mining, mineralogy, crystallography and the working of metals.

27-47. **Metallkeramik; die Herstellung von Metallkorpern aus Metallpulvern, Sintermetallkunde und Metallpulverkunde;** third edition. Franz Skaupy. 250 pp. illus. J. W. Edwards Co., Ann Arbor, Mich. $4.80.

27-48. **Metalle und Legierungen fur hohe Temperaturen.** Werner Hessenbruch. 254 pp., illus. (Reine und angewandte Metallkunde, v. 2), J. W. Edwards Co., Ann Arbor, Mich. $8.75.

27-49. **Metall-Technisches Taschenbuch.** William Monot Guertler. 370 pp., illus. J. W. Edwards Co., Ann Arbor, Mich. $7.50.

27-50. **Werkstoff-Handbuch Stahl und Eisen; mit dem Werkstoffausschuss des Vereins Deutscher Eisenhuttenleute und Zahlreichen Fachgenossen Bearbeitet.** Karl Daeves. (Verein Deutscher Eisenhuttenleute.) Second ed. 320 pp., illus. J. W. Edwards Co., Ann Arbor, Mich. $13.50.

27-51. **Pulvermetallurgie und Sinterwerkstoffe.** Richard Kieffer and W. Hotop. 403 pp., illus. (Reine und angewandte Metallkunde, v. 9.) J. W. Edwards Co., Ann Arbor, Mich. $10.50.

Employment Bureau

Address answers care of American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission.

POSITIONS OPEN

METALLURGIST, CHIEF:, Experienced as metallurgist for manufacture of steel products, especially with reference to austenitic steel. Must have degree of Metallurgical Engineer; should have knowledge of radiography. Good postwar prospects in present essential industry located in Midwestern city. Box 4-5.

METALLURGICAL ENGINEER: As sales manager for a large well-established midwest manufacturer of machines for physical testing of metals. Requirements include basic knowledge of mechanical engineering and metal-working methods together with some sales experience in similar or heavy machinery line. Send outline of qualifications to Box 4-10.

METALLURGISTS: With production, research or sales experience to act as territory field engineers. In replying state age, record and approximate salary requirements. The Titanium Alloy Mfg. Co., 111 Broadway, New York 6, N. Y.

METALLURGISTS: Experienced in stainless, heat resisting or aluminum alloys. Metallographic experience in above fields desired. Cleveland area; excellent postwar opportunities. Send full application details to Box 4-15.

LABORATORY MAN: Experienced in sand and core research and development in non-ferrous foundry. Must have two or more years of experience, college man preferred. Permanent position offering excellent opportunity. WMC rules apply. Write full particulars and qualifications in first letter to Box 4-20.

FERROUS METALLURGIST, NON-FERROUS METALLURGIST, TWO PHYSICAL METALLURGISTS, ELECTRO-PLATING CHEMIST, NON-FERROUS ANALYTICAL CHEMIST. Salaries open. Send list of experiences and salary desired to Battelle Memorial Institute, Columbus 1, Ohio.

RESEARCH METALLURGIST: Preferably one who has had several years' experience either in graduate work or in the steel industry to work in research laboratory of large manufacturer of alloy and tool steels in the East. Good opportunity for permanent position. Statement of availability required. Box 4-60.

SALESMAN: For tool steel manufacturer, metropolitan area New York. Knowledge of tool steel and territory desirable. Kindly submit qualifications, together with minimum salary desired. Box 4-65.

GRADUATE METALLURGIST: At least 5 years' experience in electric melting of high speed, tool steel in general, stainless, etc. for supervising melting. Give all information including draft status, availability, etc. Reply Box 4-70.

POSITIONS WANTED

METALLURGIST: M.S. and Sc.D. in Metallurgy; two years in industrial corrosion laboratory; five years' post-doctorate research in metallurgy and author of 40 papers, particularly on gas-metal reactions; two years assistant director of large stainless steel plant laboratory. Box 4-40.

CHIEF METALLURGICAL ENGINEER for large steel mill desires supervisory position with definite postwar future in medium size company. Proven technical supervisor in making, shaping, and heat treating of steel, specifications, applications, methods and procedures, and development engineering. Progressive, efficient; metallurgical engineering graduate, age 31. Minimum salary $400. Box 4-45.

METALLURGIST: M.S., 18 years' experience. Six years in research work; 12 years diversified steel mill experience including knowledge of open-hearth and electric furnace practice. Experienced with fabrication, processing, and heat treatment of tool steels, high speed and stainless steels. Knowledge of all types of mill operations. Desires responsible position in control or development work. Box 4-50.

METALLURGICAL ENGINEER: B.Met.E., M.S., 8 years' metallurgical and 4 years' combustion engineering experience, including steel making, rolling, process metallurgy and supervision of inspection and final equipment maintenance. Desires connection in metallurgical and combustion engineering capacity with midwestern independent company. Minimum salary $4800. Box 4-55.

HEAT TREAT SUPERINTENDENT: Annealing bright or clean work, batch or continuous furnaces; also heating of billets of non-ferrous mixtures. 20 years' experience, national plant. Box 4-25.

METALLURGICAL ENGINEER: University graduate, 14 years' experience in research development, and customer contact work in ferrous field. Railroad materials a specialty. Position in essential industry desired. Minimum salary $6500. Box 4-30.

METALLURGIST: B.S. degree in metallurgy. Sixteen years' diversified experience in steel and steel parts manufacture, direction of metallurgical, metallographic and chemical laboratories; supervision of plain carbon, alloy and tool steel heat treatment. Considerable customer contact and mill experience covering particularly cold finished steels. Desires responsible supervisory position with progressive company. Box 4-35.

ENGINEER: Degrees in metallurgy and chemistry; long and varied experience in research and control of ferrous and non-ferrous materials. Wishes connection to direct research and development control. Box 1-90.

PHYSICAL METALLURGIST-CHEMIST: Heat treating methods, control heat treating department, plain and alloy steels; magnaflux; direction of metallurgical, metallographic and chemical laboratory; some experience in aluminum, brass and zinc coated wire; dies, precision centrifugal steel casting; austempering; also knows selenium rectifier production. Reads several continental languages. Executive ability; above draft age. Box 9-55.

For Sale

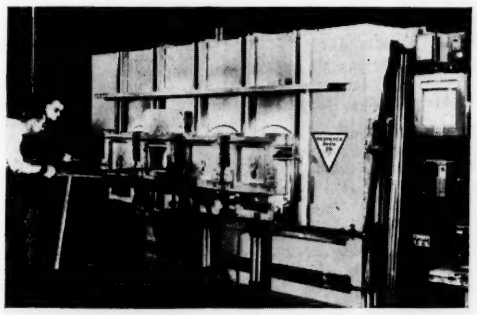
LEITZ METALLOGRAPH: Magnification range of 50 to 750 diameters, arc lamp, four objectives, five eyepieces, two 8x10 plate holders. $300. Write Arcos Corp., Dept. 737, 401 North Broad St., Philadelphia 8, Pa.

NEW PRODUCTS IN REVIEW

CONTROLLED ATMOSPHERE FORGING FURNACE

Despatch Oven Co., 619 8th St., S.E., Minneapolis 14, Minn.

Using only half the floor space formerly required by three smaller furnaces, this new type Despatch controlled atmosphere forging furnace was recently installed in an



aircraft plant. It produces 33 1/3% more than the total combined output of the three furnaces previously used.

Compact and efficient, this new type furnace utilizes a special four-in-row muffle arrangement to keep overall dimensions to a minimum—less than 12 ft. wide and 6 ft. deep. Each muffle is 12 in. in diameter and has a working depth of 36 in. Smooth uniform heat through entire 36-in. working depth of muffles results from ingenious system of back-towards-front firing.

Processing hard steel forgings at 2250° F., this furnace uses nitrogen gas and handles over 2300 pieces per day. Air operated doors shoot open quickly to allow fast removal of forgings from roomy, convenient-level hearths. This straight in-line hearth arrangement makes direct-to-press handling possible.

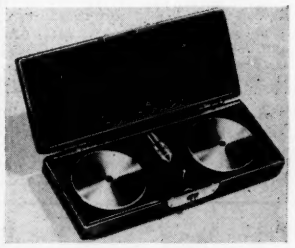
A single automatic-control system operates quick-response fuel valves to maintain heat accurately in all four muffles. Available in all sizes, gas or oil fired.

Mention R870 When Writing or Using Reader Service.

MASTER DIAMOND CHECKING SET

Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich.

This checking set is now available for checking the accuracy of hardness testing equipment, and can be used on all Clark hardness testers and other instruments used for Rockwell testing.



The set consists of a gold-plated diamond penetrator and two test blocks. The penetrator is carefully made to exceedingly close tolerances to give the highly accurate measurements required for checking readings. Since it is designed to be used only for checking purposes, it retains its original accuracy for a long period of time. When checking, the master diamond penetrator replaces the regular penetrator in the machine.

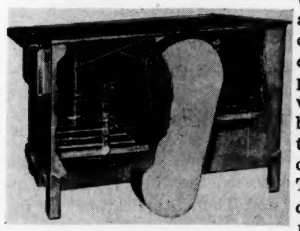
The same is true of the two master test blocks. Held to extremely close limits, they are used only in connection with the master diamond. The resulting combination furnishes a very accurate check of the machine, either as a periodical measure or whenever readings may be in doubt.

Mention R871 When Writing or Using Reader Service.

TWO-STAGE SURGE WASHER

Phillips Mfg. Co., 3425 Touhy Ave., Chicago 45, Ill.

This new development in the line of Phillips metal cleaning machinery is designed to provide economical washing for smaller parts in baskets, using an emulsion cleaner (or alkali cleaner) and water rinse. In construction the unit comprises two compartments with a dividing, insulated wall between. One contains the cleaner, the second the water rinse. The mechanism is reciprocating in action, moving the rack on which the basket rests up and down through the cleaner and rinse; it accommodates two baskets at one time, one being swished through the cleaner while the second is being swished through the rinse.



This reciprocating cycle moves the baskets vertically through the solutions, from total immersion to total emersion, producing the maximum of agitation for the removal of chips, soil, etc., not readily removed by simple cleaning. Either surge platform will accommodate basket loads of 30 lb., operated singly or together. The machine is 40 in. long by 21 in. wide. Each tank holds 16½ gal. of solvent or water and each surge platform takes baskets 14 in. square by 6 in. high.

Mention R872 When Writing or Using Reader Service.

ELECTRONIC CONTROL REGULATES METAL POURING

Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.

Automatic control of pouring operations in foundries is provided by Photoelectric Control Type A20C. With the help of these electric eyes, one operator, working from a remote station, may control the pouring of several ladles simultaneously. The hazards encountered in hand pouring are eliminated and several molds are poured in less time than was needed to pour one by the former method.

As each of the group of empty molds moves into position before a ladle, a photoelectric control mounted directly above watches through a viewing tube. When the molds are in place, the operator, through push button control of the hydraulic actuating mechanism, tips the ladles of molten iron and the white hot metal flows into the molds. As it reaches the riser of each mold, a brilliant light is thrown off—a signal to the watching eye that the mold is full. Photoswitch instantly drops the ladle back and the pouring automatically stops.

This instrument provides precise control of this and many other widely differing processes because of its ability to detect minute changes in light intensity. An adjustment on the control housing may be set so that the control will remain inoperative at one level of illumination, but will be actuated when the amount of light reaching the phototube varies slightly. It operates from a supply of 115 volts a.c., 60 cycles, and incorporates a single-pole double-throw relay for normally open or normally closed operation. Relay contacts are designed to handle 10 amp. a.c. or 5 amp. d.c.

Mention R873 When Writing or Using Reader Service.

"SCREWED-ON" TOOL BLANKS

Kennametal, Inc., Latrobe, Pa.

A new type of tool blank having a drilled and counterbored hole to provide for attachment to steel shank by means of a recessed-head cap screw has been developed by this company. The angularly set screw serves merely to hold the tip against the recess walls, which resist the main cutting thrusts.

These blanks are now available in several of the larger sizes, with formed clearance angles, RH or LH, and in all standard grades of Kennametal. Complete tools of various styles—straight edge, lead angle, offset, etc., can now be furnished with the screwed-on tips, or separate standard blanks will be supplied to those who wish to make their own tools. Blanks of non-standard shapes and sizes having this feature may also be had for special tools, such as are used in shell turning, form cutting of radii and grooves, etc.

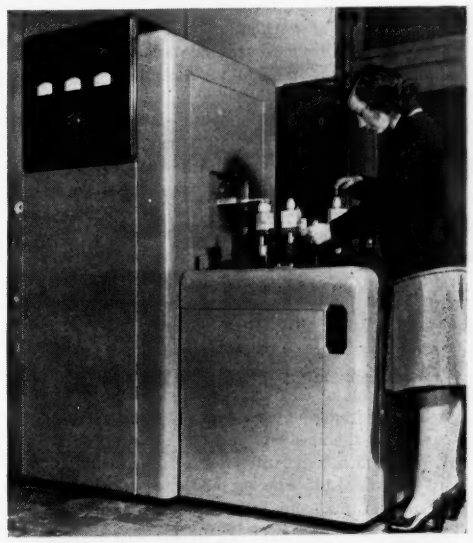
Advantages of this improved design include greater durability in use and in grinding; more consistent performance since positive mechanical fastening displaces uncertain brazed joints; opportunity of heat treating shanks to withstand the pressure of heavy cutting; simplified fastening (only one removable element); removability of tip permits independent grinding of shank; streamlined design with no projection beyond shank cross-section; minimized stock requirements, as tips of different Kennametal grades can be interchanged in the same shank; and simplified tool making, as most shops are better equipped to drill and tap holes than to braze joints properly.

Mention R874 When Writing or Using Reader Service.

ELECTRONIC INDUCTION HEATER

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Development of a new electronic induction heater for brazing, soldering, annealing, hardening and pre-forge heating applications has been announced by this company.



With a low-loss coupling arrangement, this new electronic generator can be adapted to a wide variety of metal-working applications without the use of radio frequency transformers. Predetermined automatic timing controls each unit operation, assuring uniform production quality. The operator pushes the start button, and when the operation is completed, the unit automatically shuts off.

Other features of the heater include a current limiting circuit for protecting the oscillator filament and prolonging tube life; a three-phase rectifier on larger size units to obtain maximum power and prevent unbalance of the power line; safety devices for full protection of operator and unit. Compactly built, the unit presents a modern, streamlined appearance.

Mention R875 When Writing or Using Reader Service.

READER SERVICE COUPON

CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

Check as you read—note the number immediately below the item of interest—mark this coupon and mail for prompt handling.

R856	R864	R872	R880	R888	R896
R857	R865	R873	R881	R889	R897
R858	R866	R874	R882	R890	R898
R859	R867	R875	R883	R891	R899
R860	R868	R876	R884	R892	R900
R861	R869	R877	R885	R893	
R862	R870	R878	R886	R894	
R863	R871	R879	R887	R895	

SAVE TIME—GET COMPLETE INFORMATION—CHECK THESE NUMBERS FOR ACTION

YOUR NAME _____

COMPANY _____ TITLE _____

STREET _____ CITY AND ZONE _____

MAIL TO THE METALS REVIEW, 7301 EUCLID AVE., CLEVELAND 3, OHIO

Shows How Common Alloying Elements Affect Hardenability

Reported by G. L. White
Editor, Canadian Metals and Metallurgical Industries

"The Hardenability of Steel and the Effects of Alloys" was the subject of an address by J. M. Hodge, development engineer, Carnegie-Illinois Steel Corp., Pittsburgh, at the meeting of Ontario Chapter, American Society for Metals, on Feb. 2.

The speaker discussed certain aspects of hardenability, emphasizing its relationship to microstructure and physical properties. He pointed out that the steel user is seldom interested in hardness alone, but rather in depth of hardening, and that alloying elements will usually increase the depth of hardening while the hardness itself may simply be a function of carbon content.

The general effects of alloying elements and grain size on hardenability were illustrated by means of transformation rate curves, and it was shown that the effects of alloying elements on hardenability may be quite complex.

The speaker showed the specific effects of the common alloying elements manganese, silicon, nickel, chromium and molybdenum on the hardenability in terms of a 50% martensite microstructure, and showed how these effects can be combined to calculate hardenability in these terms.

Finally, the relationships between hardenability values in terms of 50% martensite and those based on higher percentages of martensite were illustrated and discussed by the speaker.

H. M. Griffith, superintendent of open-hearths, Steel Co. of Canada, Ltd., who served as technical chairman, read a brief message from M. A. Grossmann, past president, American Society for Metals, emphasizing the friendship between the United States and Canada.

Dr. Van Wert, Consultant for Leeds & Northrup, Dies

Leland Russell Van Wert, 53, consulting metallurgist of the Leeds & Northrup Co., Philadelphia, died on March 26 following a long illness.

Dr. Van Wert was graduated from Union College in 1916, subsequently serving as instructor in metallurgy at Harvard University and assistant professor of metallurgy at Carnegie Institute of Technology, where he received the degree of M.S. in 1929. In 1930 he received the degree of Sc.D. from Harvard where he was lecturer until 1937, when he joined the research department of Leeds & Northrup Co. He became chief of the department's metallurgical section in 1939, and retained that position until his health failed. Dr. Van Wert was the author of a text, "An Introduction to Physical Metallurgy" published in 1936.

L. R. Van Wert

George H. Wright

George H. Wright of the Works Laboratory of General Electric Co., Schenectady, a member of the Eastern New York Chapter of the American Society of Metals and a former member of the Society's Recommended Practice Committee, died March 26 at the age of 62.

Mr. Wright began working for G.E. in 1902 and became recognized as an authority in the development of uses for new alloys. Outstanding was his original contribution to the manufacture and adoption of high speed steels and his development of the material known as "Calorite" for electrical resistance elements.

During the past two decades he had concentrated on the improvement of high temperature and high strength materials for use in steam turbines, particularly forgings. He was consultant on forgings to the Ordnance Bureau of Canada during World War I.

Gives Outstanding Lecture on Fatigue of Metals

Reported by J. F. Musgrove

One of the outstanding illustrated lectures of the year was presented to the Rocky Mountain Chapter in Denver on March 16 when J. O. Almen of the General Motors Research Laboratories spoke on "Fatigue of Metals." An interesting program consisting of a generous number of selections was given by the Lowry Field Quartette previous to the technical lecture.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	May 21	Engineers Club		National Officers' Night
Birmingham District	May 15		W. J. Conley	Metallurgical Aspects of Arc Welding
Boston	May 4	Hotel Sheraton		Young Men's Night and Annual Meeting
British Columbia	May 31	Hotel Georgia, Vancouver		Annual Meeting and Stag Party
Buffalo	May 10			Annual Meeting
Calumet	May 8	Vogel's Restaurant, Hammond, Ind.		
Cedar Rapids	May 8	Hotel Roosevelt	W. J. Conley	Fundamental Metallurgy as Applied to Arc Welding
Chicago	May 10	Chicago Bar Assoc.	Morris Cohen	Practical Heat Treatment of High Speed Steel
Cincinnati	Apr. 12	Engineering Society	W. H. Mather	Mechanical Properties of Austenitic Stainless Steel
Cleveland	May 7	Cleveland Club	J. O. Almen	Fatigue of Metals as Influenced by Design and Internal Stresses
Columbus	May 8	Fort Hayes Hotel	Malcolm F. Judkins	Carbide Cutting Tools
Dayton	May 9	Engineers Club	J. C. Mathes	Magnesium Alloys
Detroit	May 14	Rackham Bldg.	A. H. d'Arcambal	Wartime Developments of Tool Steels and Tools
Eastern N. Y.	May 15	Troy, N. Y.	C. E. Nelson	Magnesium Alloys
Eastern N. Y.	June 12	Circle Inn, Lathams, N. Y.		Annual Meeting—Experts' Night
Fort Wayne	May 22	Chamber of Commerce		Annual Meeting—Quiz Program
Georgia	May 7	Duchess Coffee Shop, Atlanta	Mr. Schwartz	High Speed Milling of Aluminum
Georgia	June 4	Duchess Coffee Shop, Atlanta		Press Working of Metals
Hartford	May 8	Hartford Electric Light Co.	N. K. Koebel	Industrial Controlled Atmospheres
Indianapolis	May 21	Y. W. C. A.		Annual Business Meeting
Kansas City	May 31	Pickwick Hotel		Annual Meeting
Lehigh Valley	May 19	Hotel Bethlehem		Annual Dinner Dance
Louisville	May 15	Kentucky Hotel	Bruce W. Gonser	Non-Ferrous Metals
Mahoning Valley	May 8	Dinner Bell, Youngstown, Ohio	Harry Highriter	Powder Metallurgy
Manitoba	May 10	Marlborough Hotel, Winnipeg		Annual Meeting
Manitoba	June 14			
Milwaukee	May 15	Athletic Club	V. S. Peterson	Research in Every-Day Living
Montreal	Apr. 30	Queen's Hotel	A. J. Langhammer	Machine Parts made from Powdered Metals
Muncie	May 9	Muncie Central High School	S. C. Lawson	Trends in the Use of Bronze
New Haven	May 17	Chi Psi House	Kent R. Van Horn	Radiography of Metals
New Jersey	May 21	Essex House, Newark	C. C. Furnas	Further Trend in Aviation
New York	May 14	2 Park Ave., 26th Floor	W. E. Ruder	Magnetic Materials
North West	May 17			Annual Meeting
Notre Dame	May 9	Engineering Auditorium, Univ. of Notre Dame	H. L. Maxwell	Metallurgical Materials of Construction in Chemical Manufacturing Equipment
Ontario	May 4	Hamilton	B. F. Shepherd	Martempering
Ontario	May 18	St. Catharines	Howard Stagg	Tool Steels
Ottawa Valley	May 1	Lecture Hall, National Museum	A. J. Langhammer	Machine Parts Made from Powdered Metals
Philadelphia	May 25	Engineers Club	R. B. Seger	Developments and Possibilities of Heat Treatment
Pittsburgh	May 10	Roosevelt Hotel	R. A. Grange	Metallography of Boron
Rhode Island	May 16			Twenty-Fifth Anniversary
Rochester	May 14			Annual Meeting and Election of Officers
Rockford	May 20	Faust Hotel	R. L. Wham	Temperature Measurement and Control
Rocky Mountain				
Pueblo Group	May 17	Vail Hotel	R. S. Palmer	The Future of Metals
Denver Group	May 18	Oxford Hotel	R. S. Palmer	The Future of Metals
Saginaw Valley	May 15	Dow Auditorium, Midland, Mich.	J. Vilella	Microstructure of Steel
St. Louis	May 18	York Hotel	G. J. Comstock	Powder Metallurgy
Southern Tier	May 7	I. B. M. Homestead	K. R. Van Horn	Applications of the Aluminum Alloys
Springfield	May 21	Hotel Sheraton		Annual Business Meeting
Syracuse	May 1	Onondaga Hotel		Past Chairmen's Night
Texas	May 22		A. O. Bush	Abrasives
Toledo	May 23	Toledo Yacht Club	E. O. Dixon	Better Metal Quality Through Forging
Tri-City	May 8	Hotel Ft. Armstrong, Rock Island, Ill.	John A. Dow	Gas Atmosphere in Heat Treating Steels
Warren	May 10	I.O.O.F. Hall		Annual Business Meeting
Washington	May 14	Hotel 2400		National Officers' Night
West Michigan	May 21	Rowe Hotel, Grand Rapids	O. J. Horger	Fatigue Analysis and Photoelastic Studies
Worcester	May 9	Hotel Sheraton	A. K. Seeman	Flame Hardening

Three Types of Centrifugal Casting Differentiated

Reported by L. P. Rice
Bendix Products Division of Bendix Aviation Corp.

Advantages and disadvantages of centrifugal castings as compared with forgings and static methods of casting were pointed out by Charles K. Donoho, metallurgist of the American Cast Iron Pipe Co., Birmingham, Ala., speaking before the Notre Dame Chapter Feb. 14th meeting. Efficiency and soundness of the centrifugal castings together with high net yield of metal and more production possibilities are some of the advantages. Limitations of size and shape together with high costs of equipment were listed as disadvantages.

Mr. Donoho differentiated between the dynamic casting methods as centrifuging, semi-centrifugal casting, and true centrifugal casting.

Centrifuging has been used for many years by dentists in the casting of precious metal fillings, enabling them to get small castings to conform to the exact shape of mold.

Semi-centrifugal casting employs rotation of the mold on a vertical axis as an aid in getting metal to fill the furthermost recesses of the mold. This is generally accomplished with ordinary molds such as used in regular foundry practice. In some cases, risers can be eliminated.

True centrifugal casting is the most important and most widely used method of dynamic casting. This method generally involves rotation on a horizontal axis without the use of a core. Many types of centrifugal castings are made by this method.

Some excellent slides were shown illustrating methods, molds, foundry technique, types of casting produced and structures encountered. Some important parts which have been and are being produced by centrifugal casting methods are aircraft cylinder barrels, gun barrels, ship propeller shafts, and special high alloy retorts for use in the production of magnesium.

Mr. Donoho was careful to point out that in some instances centrifugal casting has been oversold as a "cure-all." He left no doubt, however, that centrifugal casting as an important foundry method is here to stay.

Takes New Chair of Metallurgy At Istanbul University, Turkey

William F. Chubb, formerly of London, has accepted an invitation to occupy the newly created chair of metallurgy at Istanbul University, Turkey. Dr. Chubb has for some time been director of laboratories at the Turkish Iron and Steel Works, Karabuk, Turkey.

This represents a new departure for Turkey in that metallurgy and metallurgical sciences have not hitherto been taught in this country, Dr. Chubb writes. It has been necessary to introduce these courses to keep pace with the present industrial growth of the country.

W. F. Chubb

Strain Gages Permit Design Savings

Emphasizing the theme that by means of a new development in physical testing we can now measure service stresses accurately and thus redesign to distribute stresses uniformly through the structure, F. G. Tatnall of the Baldwin Southwark Division, Baldwin Locomotive Works, addressed the New Haven Chapter on "Strain Gages and Their Application" at the meeting on Jan. 18.

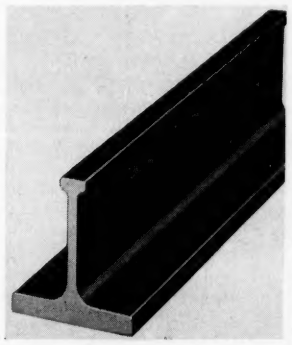
By means of this simple instrument strains can be cheaply measured nearly simultaneously over all parts of large structures in operation. Thus engineering products can be redesigned to save metal, weight and costs and to increase service reliability.

NEW PRODUCTS IN REVIEW

NEW TRAMRAIL SYSTEM

The Forker Corp., 1839 E. 47th St., Cleveland 3, Ohio

This system has been developed for use by mass production industries for moving and handling of raw stock, parts in process and finished products. It consists of several one-piece rolled steel tramrail sections of simple design and heavier construction, suitable for various span and load conditions. The Ohio Teerail Section is shown here. Trollies are available for both chain and electric hoists. Also included are monorail switches, monorail cranes, and below-the-hook devices. A special new feature is "shielded electrification," a safe means of getting power to trollies and cranes, with live conductor bars covered against contact by workmen. Rail comes cut to length for specific needs.



Mention R876 When Writing or Using Reader Service.

COMBUSTION TUBE ASSEMBLY

Harry W. Dietert Co.,
9330 Roselawn Ave., Detroit 4, Mich.

An improved combustion tube assembly for carbon and sulphur determination in metals and other combustible materials is announced by this company.

Two lengths of cylindrical refractory tube liners are inserted within the combustion tube. Combustion tube assembly is inserted within a high temperature laboratory combustion furnace. The boat containing the weighted sample is placed within the liner at the center of the combustion tube. This center liner will protect the combustion tube from the metal and slag splatter. When the center liner becomes so full of splatter that it interferes with the boat passage, it is removed and a new liner is inserted.

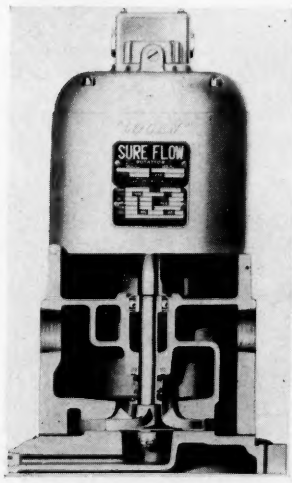
The life of the combustion tube is materially increased when liners are used. It makes for time-saving and more economy than the practice of using boat covers, it is said.

Mention R877 When Writing or Using Reader Service.

CENTRIFUGAL PUMPS

Logansport Machine Co., Inc., Logansport, Ind.

This improved line of centrifugal pumps includes 27 different sizes and types known as "Sure-Flow" pumps. While these pumps are designed especially for pumping coolants and cutting oils, they are adaptable for circulating cooling liquids or quenching oils. One of the features is the open impeller. It eliminates the need for close clearance or metal-to-metal contact of running parts, and thus allows pumping of liquids containing some abrasives, filings and other foreign matter without damage to the pump.



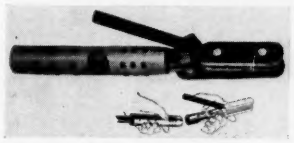
The pumps are equipped with integral motor drive, which allows greater latitude in locating the pump, since no gears, chains or other forms of mechanical drive are necessary. Thus, there are no vibrations set up, which might be transmitted through the frame and spindle to the work and prove detrimental, particularly on grinding, honing or other precision operations. The base and bracket mounted models are self-priming without submerging and afford extreme latitude in locating the pump in relation to the liquid to be pumped. These two models can be installed at any convenient point above, below or remote from the liquid. Self-priming without submerging is readily accomplished without resorting to the use of auxiliary priming reservoirs, check valves or other necessary equipment. Foot mounted, flange mounted, grinder and submerged types are also available. Catalog No. 62 describes these pumps in detail and is available upon request.

Mention R878 When Writing or Using Reader Service.

ELECTRODE HOLDER

Detroit Electrode Holder Mfg. Co.
2032 Forest Ave., West, Detroit 8, Mich.

This electrode holder is designed so that the front assembly may be readily detached by hand without shutting down the welding machine. Known as the Marine Model, the holder is of the resilient-jaw type, fully insulated. It is said that removing or re-attaching the front requires but 15 sec.



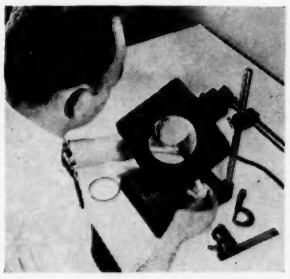
The manufacturer recommends that operators be instructed to remove fronts whenever they leave the job, even temporarily, stating that the holder may then be left anywhere without danger of an arc. A further recommendation is that all fronts be turned in at the close of each shift for inspection and such repairs as may be necessary. This procedure affords the safety values of a fully insulated holder at all times. Aside from this safety feature, higher efficiency results from providing welders with newly conditioned tools at each shift and reduces time consumed by the electrical department in making cable connections.

Mention R879 When Writing or Using Reader Service.

ALL-ANGLE MAGNIFIERS

Ullman Products Co., 857 Fourth Ave., Brooklyn 32, N. Y.

Inspection work demanding careful scrutiny of small objects is performed accurately and easily with this C-Master magnifier. Newest additions to this line are three recently developed all-angle, illuminated models. Two of these are stand models and the third is a portable hand type.



The lighting equipment of the stand model 410 and portable model 610 consists of four incandescent tubes which can be lighted two at a time or all four at once. Two fluorescent tubes are used in stand model 210. Shadow-free, compact, and easy to handle, all three models are ideal for continuous inspection where manification plus light is required.

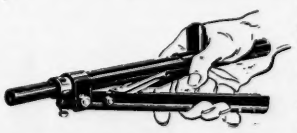
A large, clear 4½-in. double convex lens, ground and polished, magnifies all objects up to twice size. Undistorted view of the work is provided.

Mention R880 When Writing or Using Reader Service.

RIVET GUN

Cherry Rivet Co., 231 Winston St., Los Angeles 13, Calif.

This new, compact light-weight rivet gun is known as the G-35. Designed for installing Cherry blind rivets in hard-to-get at blind spots, it is operated with one hand; it installs the rivet from one side of the job with a pulling force, and eliminates the necessity of a man on the other side of the rivet.



It has proved its ease and flexibility of use in such industries as aircraft, sheet metal, radio, marine, railroad, automotive and furniture.

The gun is small, compact, flexible, measures only 11½ in. in length, weighs approximately 1½ lb., and is well-balanced for easy one-hand operation. The pulling head is notched so that it snaps onto or off the gun quickly and easily, allowing greater gun flexibility and quicker head interchange. This gun is especially adaptable for cramped installations.

Mention R881 When Writing or Using Reader Service.

HIGH SPEED PLATING

Joseph B. Kushner, Metal Finishing Engineer
233 West 26th St., New York 1, N. Y.

This new process and machine for high speed plating of wire, metal ribbon and small parts is said to be based on revolutionary techniques. The machine for wire plating, for example, is capable of handling wire from 0.0025 in. up to light cable at speeds ranging from 150 to 750 ft. per min. and higher. Deposits of metal can be made to close specification as regards thickness and weight.

Overall length of the machine may run from 18 to 36 ft. depending on the amounts and number of metal deposits required on the wire. A machine capable of plating a 2% by weight deposit of gold on fine silver wires at a speed of 300 ft. per min. is 22 ft. long. The machine is capable of handling 12 lines of wire at a time, each receiving the same uniform plate of metal. All platable metals are capable of being handled by the process and machine.

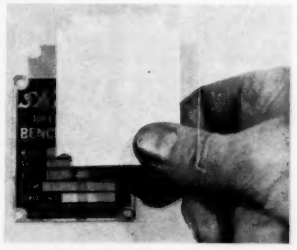
In another variation, a machine designed for plating small parts can gold and silver plate radar parts to 20 or 40 m.s.i. at such rates as to offer definite advantages over barrel plating techniques, particularly in view of the far more uniform deposits produced by the machine and the minimum amount of labor required in its operation, according to Mr. Kushner. High speed zinc plating of items such as 30 and 50-caliber steel cartridge cases is one of the many possibilities offered by the machine. Applications for patents have been made.

Mention R882 When Writing or Using Reader Service.

MASKING NAME PLATES

Avery Adhesives, 451 East Third St., Los Angeles 13, Cal.

A new method of masking name and instruction plates has been developed with Kum-Kleen masking stickers now available die-cut to the exact specifications of the manufacturer. The name plate is attached to the product on the production line, covered with pre-cut masking sticker and then painted or finished. Heretofore it was necessary to pre-cut masks by hand or return the products to the production line to have the name plate attached after finishing. These masking stickers, in addition to being die-cut, are applied without moistening, stick to any smooth surface, are not affected by heat or cold, and easily peel off without leaving a trace.

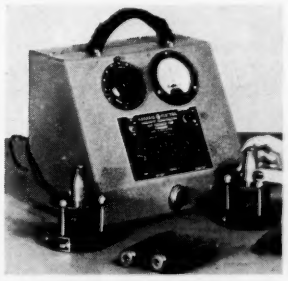


Mention R883 When Writing or Using Reader Service.

REDESIGNED MAGNETIC COMPARATOR

General Electric Co., Special Products Division, Schenectady, N. Y.

The magnetic comparator, providing a quick, simple, non-destructive method of inspecting ferrous parts, has been redesigned to permit a more functional arrangement of its components. Desirable for testing rods, bolts, springs, and small fabricated parts, this portable equipment immediately discerns variations in composition, hardness, or other characteristics which affect magnetic properties.



New features include an attractive new gray steel case with a sloping front panel on which are located the indicating instrument, variable-voltage transformer, and the necessary rheostats and switches. Graduated dial plates on the sensitivity and balance control rheostats have been added to allow duplication of settings. In addition, a light now indicates whether or not the power is on. Receptacles for making connections to the test fixtures and power sources are at the back of the case.

The redesigned instrument incorporates all the basic functions of the previous model. The circuit is balanced by placing an acceptable part in each of the two test fixtures. One of these parts is then removed and those to be tested are individually inserted. Any deflection of the instrument pointer indicates a deviation in magnetic characteristics from that of the standard. A new bulletin describes the features of this instrument in greater detail.

Mention R884 When Writing or Using Reader Service.

RIVET REMOVER

Topflight Tool Co., Chestnut Ave., Towson 4, Md.

This new tool was invented to remove rivets quickly without enlarging the hole or distorting the sheet. It has been thoroughly tested in actual use. The defective rivet is instantly removed and a new rivet of the same size installed without distortion of the skin. Guides, chucks and drills are dispensed with. A two-way bucking bar is furnished with each rivet remover. Standard models remove ⅛ and 5/32 rivets. Special models are available for any size rivet. The rivet remover is attached to any standard automatic rivet gun. The pulsating action operates the remover without effort on the part of the operator. Results are uniform. Illustrated literature is available.

Mention R885 When Writing or Using Reader Service.

MANUFACTURERS' CATALOGS IN REVIEW

Long Flame Burner

Bloom Engineering Co.,
857 W. North Ave., Pittsburgh 12, Pa.

This eight-page bulletin describes a luminous flame burner for steel mill reheating furnace operations which is available as a combination burner designed to use gas and oil. Uniform air distribution is assured by a patented feature. As the air enters the body of the burner it passes between radial vanes and its flow is thus straightened to surround the gas nozzle uniformly. This principle governs burner port size and capacity.

Flame retention is achieved in the burner by a small patented bell flange nozzle tip. This produces a turbulence in the contacting layers of both air and gas at the point where they merge, providing a burnable mixture retained in the port block.

This bulletin includes engineering data developed from practical steel plant tests. A valuable curve is presented which gives the radiating power of luminous flames at various flame temperature and steel surface temperature. This curve eliminates much tedious and often inaccurate calculation. An important feature of the burner is its availability as a combination burner for either gas or oil, with provisions for switching from one to the other with no loss of production. In areas where the gas supply is uncertain, or in steel plants where coke oven gas is not always available, this feature is extremely desirable. The air supply is the same for either fuel.

Other applications of the burner include its use in slow-cooling pits, annealing furnaces, heat treating operations, large and small forging furnaces, and car-type annealing furnaces.

Mention R886 When Writing or Using Reader Service.

Phosphor Bronze

Seymour Mfg. Co., Seymour, Conn.

Several types of phosphor bronze in sheet, rod, and wire forms are described in this 12-page booklet. Sizes, specifications, tempers, tolerances, properties, and applications are presented in chart form and illustrations are presented showing many uses. Tables are also given showing weight of phosphor bronze in sheet, rod, and wire.

Mention R887 When Writing or Using Reader Service.

Electronic Resistance Thermometer

Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio

This bulletin No. 230-A features Pyrotron electronic resistance thermometers in indicating, recording and controlling models, for temperature ranges between the limits of — 100° F. and + 1200° F.

The instruments are well suited for marine, mobile or other classes of severe service since no galvanometers or millivoltmeters are used. No parts move in the measuring circuit except during temperature changes. The bulletin lists outstanding features; describes the electronic detector and motor control; gives definite information on ranges, power supply required, speed of response, accuracy, sensitivity, installation, standard chart ranges, automatic control application, alarm contacts, temperature sensitive elements, and measuring circuits.

Mention R888 When Writing or Using Reader Service.

Tool Treatment

Perfection Tool and Metal Heat Treating Co.,
1740 West Hubbard St., Chicago 22, Ill.

"Fifty Facts" is the title of a booklet citing the experience of fifty plants in producing tools to work longer and better through the use of new and better ways of hardening soft steels and a supplementary treatment called "Ad-Life" for previously hardened, finished tools. Even brand new tools can be Ad-Lifed. Since no rehardening is required, there is no danger of fracture or distortion. Tools thus treated have been found to stand longer runs between grinds.

Mention R889 When Writing or Using Reader Service.

Gas Analysis Apparatus

Burrell Technical Supply Co.,
1936 Fifth Ave., Pittsburgh 19, Pa.

Typical new models of Burrell gas analysis apparatus are shown in this four-page leaflet which is published in advance of the new 96-page Burrell Gas Analysis Catalog and Manual for Gas Analysts which is now in preparation. Both de luxe and portable models are pictured in this leaflet.

Mention R890 When Writing or Using Reader Service.

Heat Treating With Ammonia

Pennsylvania Salt Mfg. Co.,
1000 Widener Bldg., Philadelphia 7, Pa.

This 16-page booklet should be an aid to heat treaters in the safe handling of anhydrous ammonia. No attempt is made to discuss operating details except as they directly bear on ammonia. The booklet discusses the ideal container for anhydrous ammonia and its use in connection with nitriding. Charts and tables are used to illustrate the booklet.

Mention R891 When Writing or Using Reader Service.

Rigidized Metals

Rigid-Tex Corp., Buffalo 3, N. Y.

This 16-page bulletin on Rigidized Metals describes the technique used in the preparation of these metals and typical war and post-war applications in which the advantages provided by the process are most useful.

In this patented design-rolling process, sheet or strip metal (ferrous or non-ferrous) is scientifically redistributed throughout the cross-section and away from the neutral axis giving patterned surface effects and producing marked changes in mechanical, textural, and utility values.

The controlled scientific distribution of the metal assures efficient dispersion of stresses and increases strength-weight and rigidity-weight values, buckling strength and resistance to impact. Higher mechanical values per pound of weight are obtained than with the original unprocessed metals. The bulletin diagrams and gives specific data on these features and illustrates 14 different Rigidized metal patterns. A large number of patterns can be developed, giving textured surfaces that provide useful and attractive designs and eliminate undesirable reflections, highlights, fingerprints and other blemishes.

The booklet shows also how Rigidized metals simplify design and fabrication problems due to special utility patterns developed for special applications. Also included are suggestions for manufacturers on how to fit Rigidized metals into their products and processes. The bulletin concludes with illustrations of the various fabrication methods which can be used on Rigidized metal including stamping, bending, punching, roll-forming, cycle welding, seam welding, riveting and soldering.

Mention R892 When Writing or Using Reader Service.

Radium Service

Lustrolite Cleveland Corp.,
6927 Carnegie Ave., Cleveland 3, Ohio

This company, at present engaged in applying radium paint to aircraft instrument dials, announces a folder which describes their radium applicating service and highlights the scope and advantages of radium paint and other luminous compounds.

A variety of uses such as aircraft instruments, meter dials, calibration markings, safety markers, signs, indicators, control panels, wall switchplate locaters, and luminous warning signals are mentioned. A few of the more important advantages claimed for radium paint are its self-activating characteristic, its ability to give off a steady glow, and freedom from encumbrance of wiring, electrical apparatus, bulbs or fuses. Elimination of hazards from combustion and power failure are other advantages. Not only self-activating radium but also phosphorescent and fluorescent coatings for short-time glow are applied in the Lustrolite laboratories. War and postwar applications are described in this folder.

Mention R893 When Writing or Using Reader Service.

Magnesium Castings

Superior Bearing Bronze Co., Inc., Magnesium Division,
140 Banker St., Brooklyn 22, N. Y.

The light weight, high strength and durability of magnesium sand castings have opened enormous possibilities to machine and product designers in all fields, and facts for the designer are packed in this four-page leaflet. The strength and fatigue values of magnesium sand castings are considered along with such factors as finish metal allowance, threads, stud bosses, stress concentration and section junctions and fillets.

Mention R894 When Writing or Using Reader Service.

Vibration Control Unit

The Korfund Co., Inc.,
48-15 Thirty-second Place, Long Island City 1, N. Y.

The newly developed type SL Universal Vibro-Isolator is described in detail in this four-page bulletin. It points out that the ability of the unit to absorb vibration in all directions makes it an effective vibration control for a wide variety of applications including punch presses, shears, hammers, grinders, shakers, generators, material testing equipment, and recording apparatus. It is said to be particularly effective in cushioning impacts from all horizontal directions where unbalanced forces, centrifugal action or external belt pulls are encountered.

The bulletin contains complete data regarding the rated loads, weights and dimensions in the six basic sizes in which the Type SL Vibro-Isolator is made. According to these data the load capacity of the different sizes ranges from 200 to 12,000 lb.

Mention R895 When Writing or Using Reader Service.

Abrasive Grinding Wheels

Abrasive Co., Division of Simonds Saw and Steel Co.,
Tacony and Fraley Sts., Philadelphia 37, Pa.

This is a literature combination presenting information that is essential for making the selection, buying and using of abrasive grinding wheels easier and more convenient. Grinding Wheel Data Book Supplement (24 pages), Form ESA-73, presents information on standard wheel markings, wheel selection table and general recommendations. The standard marking folder and chart (Form ESA-72) explains what standard marking means and why it is helpful. A third booklet running to 100 pages (Form ESA-52-5) is a handbook of general information showing charts and tables on the selection and use of grinding wheels.

Mention R896 When Writing or Using Reader Service.

Furnace Treated Bar Steels

LaSalle Steel Co., P.O. Box 6800-A, Chicago 80, Ill.

The economies of furnace treated bar steels—steels with high strength, toughness, machinability or wearability right in-the-bar as received—have been proved by extensive use, according to this attractive 12-page booklet. The booklet shows how engineering and fabrication problems may be solved by furnace treatment and how furnace treated bars can meet specific requirements. It is claimed that a great deal of heat treating can be eliminated by the use of these quenched and tempered bars.

Mention R897 When Writing or Using Reader Service.

Dust Collectors

Peters-Dalton, Inc., Detroit 1, Mich.

This company has developed dust collectors of all sizes, from the small, individual, portable unit of 700 c.f.m. to the huge central systems of 100,000 c.f.m.; spray booths large enough to accommodate an entire bomber, wings and all; drying ovens from a size about the dimensions of a domestic refrigerator to the vast conveyorized sizes necessary to accommodate truck frames and large fabricated assemblies; many types of washers and complete systems embracing equipment essential to dust collecting, spray painting, and requirements of a finishing department. Many types of this equipment are described in this attractive and comprehensive 60-page spiral-bound book. A very interesting section is devoted to engineering data.

Mention R898 When Writing or Using Reader Service.

Batch Cleaning Equipment

Optimus Equipment Co., 171 Church St., Matawan, N. J.

Manufacturers of washing, rinsing, pickling and drying equipment for metal parts, this company has just issued a four-page bulletin 4E2, entitled "Batch Cleaning in Portable Metal Washing Machines for Production Maintenance and Repair." This bulletin describes portable machines of the dip-agitating type (single and double load) and the spray type. All of these machines can be used for cleaning, washing, paint stripping, rust prevention, rinsing and coating.

Mention R899 When Writing or Using Reader Service.

Electrode Wall Chart

Metal and Thermit Corp., 120 Broadway, New York, N. Y.

This Murex wall chart serves as a useful guide in selecting the proper electrodes for individual welding jobs. The chart contains a list of Murex electrodes divided into four groups for quick reference, including mild steel, special steels, stainless steels, and hard surfacing. Electrodes are described according to A.W.S.-A.S.T.M. class, with color identification, recommended current strengths, polarity, and physical properties. There are also brief descriptions of the general characteristics of the Murex electrodes and their applications.

Mention R900 When Writing or Using Reader Service.

Index to Advertisers

Advertising Representatives

945

W

chart
means
to 100
infor-
on and

vice.

-steels
wear-
ved by
book-
cation
d how
ts. It
an be
pered

vice.

sizes,
m. to
ooths
wings
ons of
sizes
fabri-
plete
cting,
epart-
ed in
ound
ering

ice.

J.
rying
ssued
g in
inte-
ma-
load)
used
tion,

ce.

ce.

N. Y.
lect-
The
four
ecial
s are
color
rity,
tions
and

ce.

ALS

uller
treet
2713